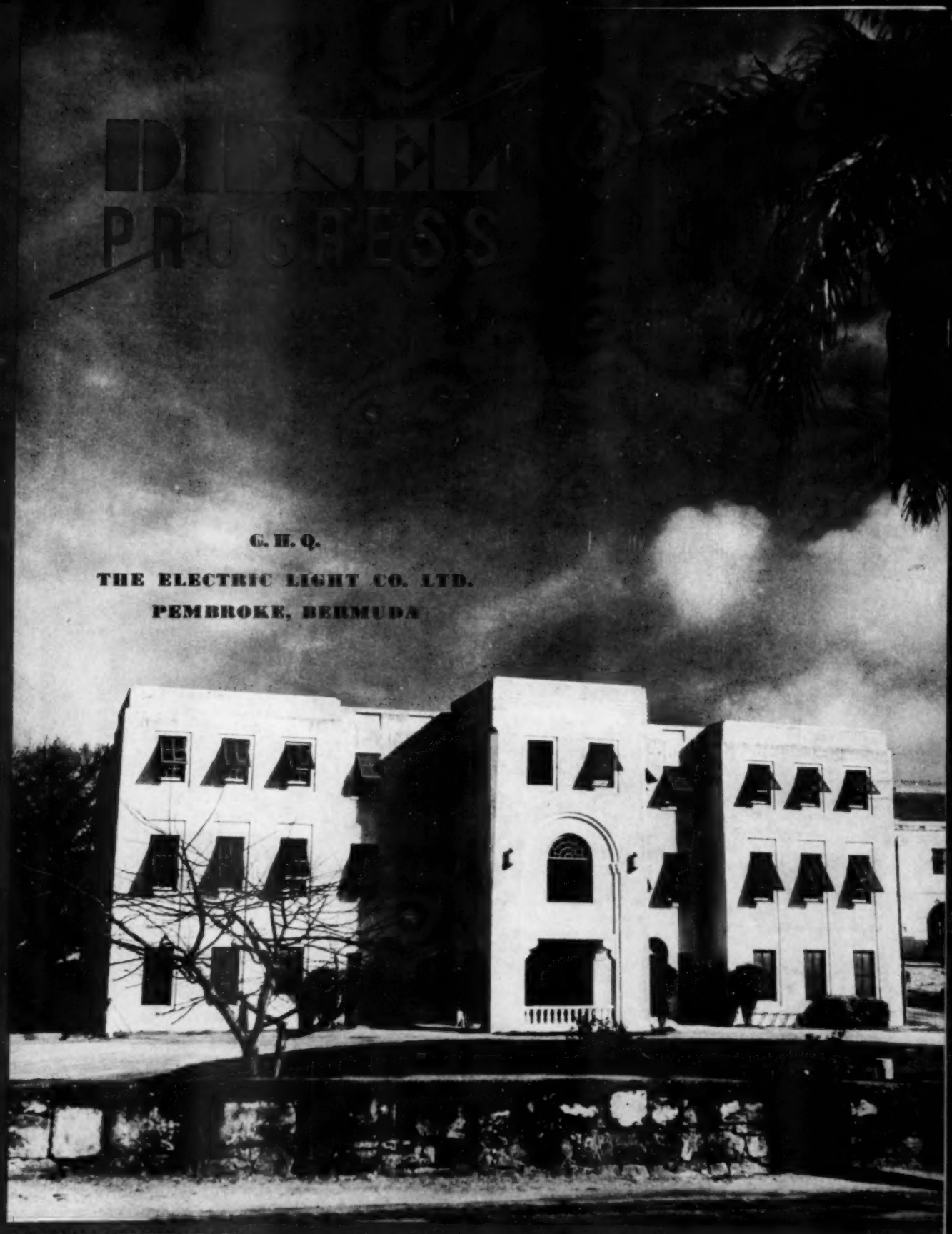
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



G. H. Q.

THE ELECTRIC LIGHT CO. LTD.

PEMBROKE, BERMUDA

FIVE DOLLARS PER YEAR

APRIL, 1951

FIFTY CENTS PER COPY

BERMUDA

This latest Bermuda installation -- a 10-cylinder, 4,250 h.p. Nordberg Diesel -- adds 3,000 kw. to the Bermuda Electric Light Company's generating capacity. Engine is lubricated with Texaco in both crankcase and cylinders.

Original Nordberg engine installed in 1939 in Bermuda Electric Light Company's plant at Pembroke, Bermuda. This is an 8-cylinder, 2-cycle, 3,180 h.p. engine, which has given satisfactory and economical service. It is Texaco-lubricated.

TUNE IN . . .
TEXACO STAR THEATER
starring MILTON BERLE
on television
every Tuesday night.
See newspaper for
time and station.

TEXACO

TEXACO

DIESEL PROGRESS for April, 1951, Volume XVII, Number 4. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 816 North La Cienega Boulevard, Los Angeles 46, California. Rex W. Wadman, President. Subscription rate: $5 per year, single copy 50c. Acceptance under 34.64, P. L. & R., authorized.

DIESELS RUN CLEAN

Bermuda Electric Light Company's two Nordbergs are lubricated with TEXACO URSA OILS

When Bermuda's new 4,250 h.p. Nordberg Diesel went on the line in August, 1950, there was no question about what lubricating oil to use. *Texaco Ursa Oils* were the inevitable choice because of their outstanding performance in the original 3,180 h.p. Nordberg installation, made some years previous.

Today, *Texaco Ursa Oils* are on the job in both these great engines . . . keeping them clean . . . assuring low maintenance costs and economical operation.

Texaco Ursa Oils stand up under heat and pressure . . . maintain their extra-high resistance to oxidation throughout an extra-long service life. They keep engines free of harmful carbon and sludge . . . assuring proper valve action, open ports, free rings for proper compression and combustion. *Texaco Ursa Oils* protect modern alloy-type bearings against corrosion, guard moving parts against wear.

You can get *Texaco Ursa Oils* in the right viscosities for every type and size of Diesel, gas or dual-fuel engine. Leading engine builders approve them and operators' preference has made them America's favorites. For example, in the Diesel field alone —

More stationary Diesel horsepower in the U. S. is lubricated with Texaco Ursa Oils than with any other brand.

Keep *your* engines clean; keep *your* costs low. A Texaco Lubrication Engineer will gladly help you. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

Dredge *Sandpiper*. Built by Canadian Vickers, Ltd., Montreal. Length, 250 feet. GM Diesel-Electric Drive.

Keeping the oil lanes open

THE NEW GM Diesel-Electric dredge *Sandpiper* was recently placed in service by the Marine Conference on Lake Maracaibo Bar, Venezuela.

The *Sandpiper* helps clear the way for the large fleet of tank ships which daily carry crude oil to the refineries located in the Paraguana Peninsula and on the islands of Aruba and Curacao in the Caribbean Sea.

GM DIESEL POWER

ENGINES FROM 150 TO 2000 H.P.

Leader in Diesel engineering development for 39 years

Cleveland Diesel Engine Division

CLEVELAND 11, OHIO

GENERAL MOTORS

General Motors Diesel-Electric Drive has powered more than 700 vessels in 22 different classifications.

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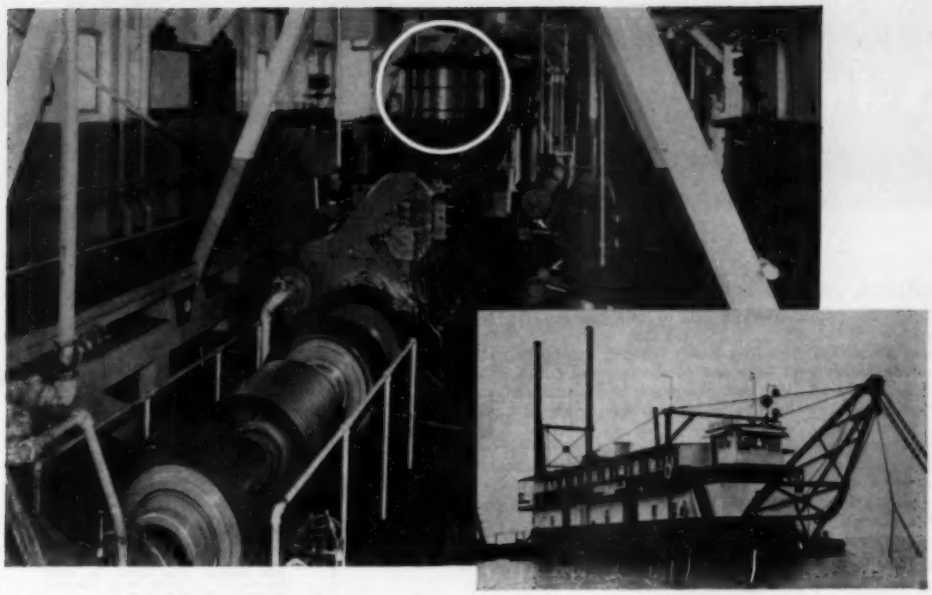
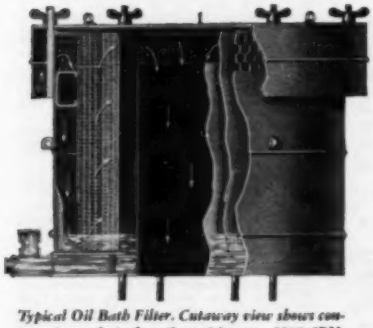


HOW AIR-MAZE FILTER GIVES LONGER LIFE TO THIS DREDGE'S DIESEL



Typical Oil Bath Filter. Cutaway view shows construction and air flow. Capacities up to 6500 CFM.

THE 760 h.p. Cooper-Bessemer diesel engine in the dredge "Hampton Roads" is assured of long life and a minimum of maintenance with an Air-Maze oil-bath filter on the air intake.

Air-Maze oil bath filters remove damaging dust and dirt by passing intake air through an oil-filled bowl, then through the oil-washed filter media. The air is literally "scrubbed" clean before it reaches engine parts.

Air-Maze oil bath air intake filters are among the many Air-Maze air and liquid filters used by leading diesel manufacturers to make their products last longer, work better, require less maintenance. The Air-Maze Corporation, Cleveland 5, Ohio.

The biggest names in diesels are protected by Air-Maze filters

AIR FILTERS
SILENCERS
SPARK ARRESTERS

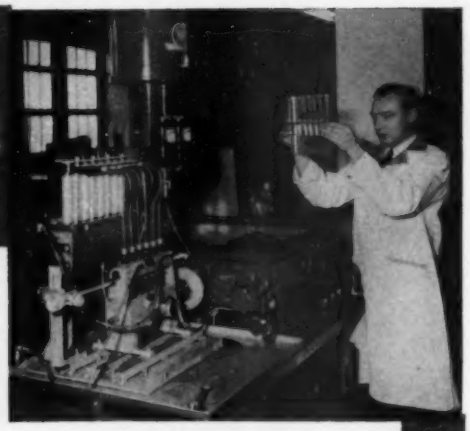
AIR-MAZE
THE FILTER ENGINEERS

LIQUID FILTERS
OIL SEPARATORS
GREASE FILTERS

competent, dependable

FUEL INJECTION SERVICE

for AMERICAN BOSCH-equipped diesels



CRAFTSMANSHIP, PRECISION, KNOW-HOW—typical of American Bosch manufacture—are carried over in full to our ever-growing service organization.

At these authorized American Bosch stations, factory-trained mechanics are constantly kept informed of the latest and most efficient service methods... work with test equipment and specialized service tools that are designed and built to factory standards for accurate, reliable servicing.

Complete precision service like this saves time and money for owners of American Bosch equipped diesels... helps keep their engines functioning at top-notch efficiency. It's one more reason why *dependable* fuel injection equipment by American Bosch *stays dependable* throughout a long and economical life.

IN NORTH AMERICA ALONE THESE 115 AUTHORIZED AMERICAN BOSCH STATIONS SERVE DIESEL USERS

ALABAMA—Birmingham 3, Birmingham Electric Battery Co., Ave. B & 23rd St. S.

ARIZONA—Mesa, Perkins Diesel Service, 747 South Mesa Blvd.; Phoenix, Charlie C. Jones Battery & Electric Co., 318-322 W. Jefferson St.

ARKANSAS—North Little Rock, Womack Brothers and Taylor, 322 East Washington.

CALIFORNIA—Fresno, Winther Bros., 612 Divisadero St.; Los Angeles, Diesel Injection Equipment Co., 4847 Anchelm Telegraph Rd.; Los Angeles 21, Magneto Sales & Service Co., Inc., 751 Towne Ave.; Sacramento 6, Langner & Rifkin, 1116-22 13th St.; Salinas, Haag Diesel Electric, 37 Abbott St.; San Diego, Magneto Sales & Service Co., 1254 Kettner Blvd.; San Francisco 3, Furrer & Ustar, 225 Seventh St.; Wilmington, Diesel Central Corp., 218 North Marine Ave.

COLORADO—Denver 3, Central Supply Company, 1171 Lincoln St.

DISTRICT OF COLUMBIA—Washington, Diesel & Ignition Service, Inc., 925 Girard St., N. E.

FLORIDA—Jacksonville, Patten Sales Co., Inc., 1021 Hagan St. Jacksonville, Spencer Electric, Inc., 40 West Beaver Street. Miami 36, Florida Diesel Service Co., 1930 N. Miami Ave. Tampa, Stuart Diesel Service, 3101 4th Ave.

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ILLINOIS—Chicago 16, Illinois Auto Electric Co., 2011-37 S. Indiana Ave. Rock Island, Lehss Automotive Service, 430 17th Street.

INDIANA—Indianapolis 4, Gulling Auto Electric Inc., 450 N. Capitol Ave.

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LOUISIANA—New Orleans, Gerhardt's Fuel Injection Service, 734 Girod Street. New Orleans 13, John M. Welton, Inc., 1050 Carondelet St. Shreveport, Vaughn Tractor & Auto Parts Co., 224 Airport Drive.

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MISSISSIPPI—Jackson, Womack Brothers, 1305 South Gallatin Street.

MISSOURI—Kansas City 2, Electrical & Magneto Service Co., 2538 Grand Ave. St. Louis 23, Diesel Fuel Injection Service Co., 9231 So. Broadway. St. Louis 3, Electric Parts and Service Co., 2900 Washington Blvd.

MONTANA—Billings, Original Equipment, Inc., 423 North Broadway.

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NEW JERSEY—Newark 2, Tire Trading Company, Inc., 239 Halsey St.

NEW YORK—Brooklyn 9, E. A. Wildermuth, Inc., 1102 Atlantic Ave. Bolivar, Bolivar Magneto Co., 60 Wellsville St. Buffalo 8, Hattrich Electric Service, 1032 Ellicott St. New York 19, American Bosch Corp., New York Service Sales Division, 401 W. 51st St. Syracuse 4, F. A. Crossman, Inc., 943 West Genesee St. Troy, Ehrlich Electric Service, Inc., 200 Fourth St. Utica, Stiefvater Electric Co., Inc., 320-322 Lafayette St.

NORTH CAROLINA—Charlotte, Carolina Rim & Wheel Co., 301 East 8th St.

NORTH DAKOTA—Fargo, Northwestern Diesel Equipment Service, 2800 Front St.

OHIO—Cincinnati, Tri-State Distributing Corp., Broadway at Eighth. Cleveland 14, The Cleveland Ignition Co., 1301 Superior Ave. Columbus 15, Columbus Ignition Co., 211 Neilston Ave. Lisbon, Diesel Service Co., 234 East Washington St.

OKLAHOMA—Fairview, Keck Bros. Diesel Service, 322 South Main. Oklahoma City 2, American Electric-Ignition Co., 124 N. W. 9th St. Tulsa, Magneto Ignition Company, 701 West 5th St.

OREGON—Klamath Falls, Diesel & Electric Service, 1950 So. Sixth St. Pendleton, Eds Magneto & Diesel Co., S. W. 18th and Court Sts. Portland 14, Automotive Products, Inc., 1700 Southeast Grand Ave. Roseburg, Diesel Products, 303 East Second Ave., South.

PENNSYLVANIA—Hazleton, Penn Diesel Service Co., 27th & N. Church Streets. Philadelphia, Sullivan Brothers, 1718 Fairmount Ave. Pittsburgh 13, Automotive Ignition Co., Inc., 6358-64 Penn Ave.

SOUTH CAROLINA—Charleston, Diesel Fuel Injection Service Co., 2 Exchange St.

TENNESSEE—Knoxville, Diesel-Magneto Service Co., 1209 Island Home Ave. Memphis 4, Automotive Elec. Service Co., 982 Linden Ave.

TEXAS—Amarillo, Radcliff Bros. Electric Co., 201 East Third Street. Dallas 1, Beard & Stone Electric Co., Inc., 2101 Bryan St. El Paso, Oakes Battery & Electric Co., 423 Texas St. Houston 1, Beard & Stone Electric Co., Inc., 805 Polk Ave., P. O. Box 1717. Odessa, Electric Service & Supply, P. O. Box 1471. San Antonio, S. X. Callahan, 425 N. Flores St. San Antonio, Womack Bros., 1018 S. Presa St.

UTAH—Salt Lake City 2, Koopsel & Love, 47 East 7th South St.

VIRGINIA—Norfolk, Diesel Injection Sales and Service, 808 Union St. Richmond, C. H. Woodward Electric Co., Inc., 709 W. Broad St.

WASHINGTON—Roselle, Van's Diesel Electric Co., P. O. Box 560. Seattle 1, Seattle Injector Co., 2706 Second Ave. Seattle, Sunset Electric Co., 300 Westlake North, P. O. Box 3148. Spokane, Sunset Electric Co., North 703 Division St. Walla Walla, Industrial Products Co., 610 N. Ninth St.

WISCONSIN—Milwaukee 2, Wisconsin Magneto Company, 918 N. Broadway.

CANADA—Calgary, Hutton's, 131—11th Ave., W. Edmonton, Smith Battery & Auto Electric, 10125—105th St. Fredericton, N. B., Stairs Bros., 493 Northumberland St. Montreal, International Electric Co., Ltd., 1037 Bleury St. Quebec, Quebec Gas & Diesel Engines, Ltd., 15 Sault-au-Matelot St. Regina, Electric Motor Service, 1734 Broad St. St. John's, Newfoundland, A. H. Murray & Co., Ltd. Saskatoon, N. Lambert Electric, 114-116 Avenue A. Toronto, A. Cross & Co., Ltd., 45 Elm St. Toronto, Auto Electric Service Co., Ltd., 1009 Bay St. Vancouver, Jeffree & Jeffree, Ltd., 775 Homer St. Vancouver, Macfarlane & Co., 1955 Columbia St. Vancouver, Vivian Engine Works, Ltd., 1660 Station St. Winnipeg, Brown & Murray, Ltd., 237-241 Fort St.

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HAWAIIAN ISLANDS—Honolulu, Honolulu Iron Works Co., P. O. Box 3140. Honolulu, Toduki Machine & Marine Works, 810 Halekauwila St.

PUERTO RICO—San Juan, General Farm Equipment Co., Tres-Miramar, Santurce, P. O. Box 3588.

MEXICO—Ciudad Obregon, Sonora, Servicio Auto Electrico, S. A., Calle Sinaloa No. 400. Guadalajara, Jalisco, Electro Diesel de Occidente, Apartado No. 297. Mexico, D. F., Automotriz Servicio S. A., Fray Servando Teresa de Mier 242. Monterrey, Nuevo Leon, Electro Diesel, S. A., Esq. Avenida Morelos y Zuazua. Torreon, Coahuila, Servicio Diesel Electrico, S. de R. L., Guadalupe Victoria No. 216 — Ser. CUBA — Havana, E. Beyer y Cia., San Jose No. 155, (Service Station at Joaquin Alamay Lopez, Avenida Menocal (Infanta) 1106). Havana, Companie Riera, Toro and Van Twistern, S. A., Habana No. 86.

Complete list of foreign service stations available on request.

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CORPORATION

SPRINGFIELD, MASS.

Cummins® Custom-built Diesels

Built not once but Twice

Best buy in power is the engine that's built best

Cummins Diesels have an outstanding record *and* reputation in a wide range of Diesel applications. And here's one reason!

Rugged, lightweight, high-speed Cummins Diesels perform better because they're built better, under strictest quality control methods. Moreover, each engine is actually built twice! After initial assembly, each engine is run in on the test block. Then it is torn down and carefully re-inspected — and after that it is re-assembled and tested *again*.

Such *extra* care in precision building . . . Cummins exclusive fuel system . . . reliable world-wide service and parts organization . . . enable Cummins users to get peak performance . . . less "down-time" and *more* rugged, dependable power.

Better contact your Cummins dealer. He has more facts to show you about making more profits.

Diesel power by CUMMINS

CUMMINS Powered DIESEL

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, IND.

EXPORT: CUMMINS DIESEL EXPORT CORPORATION
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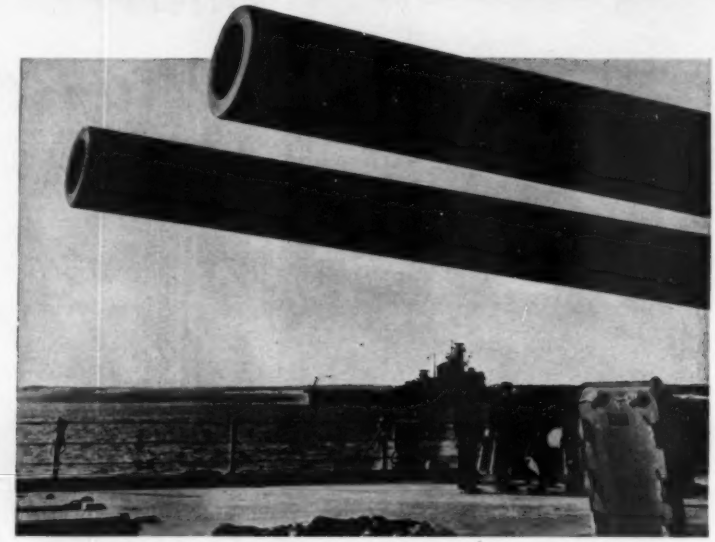
Lightweight High-speed Diesel Engines (50-550 hp) for: On-highway trucks • off-highway trucks • buses • tractors • earth-movers • shovels • cranes • industrial locomotives • air compressors logging yarders and loaders • drilling rigs • centrifugal pumps generator sets and power units • work boats and pleasure craft.

DOUBLE PROTECTION

IN THE ENGINE ROOM, TOO

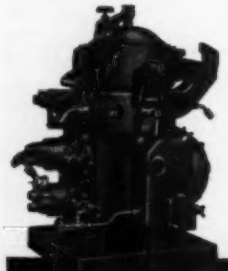


On land or sea, De Laval Oil Purifiers provide maximum protection against ***both*** principal sources of lubrication failure—***dirt*** and ***water***. They utilize centrifugal force to instantaneously remove these ***two*** trouble-makers from the oil, and thus constantly maintain its lubricating efficiency. By keeping the oil not only clean but dry as well, they enable it to perform with "new oil" efficiency and complete safety.

If the power unit is a turbine where the chief problem is that of removing sludge forming contaminants, a centrifuge alone is usually sufficient. If the prime mover is a diesel engine, requiring the removal of colloidal carbon as well as dirt and water, a De Laval "Puri-Filter" provides the best possible protection. The "Puri-Filter" consists of a De Laval centrifuge in series with filters, compactly mounted on a sturdy base.

A major advantage of ***all*** De Laval machines is that they do not remove oil-soluble additives.

Write for additional information.



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DE LAVAL

LUBRICATING OIL PURIFIERS

TWO NORDBERG DIESELS

round out 43 years of Power Progress

for Bermuda

☆ *The Bermuda light plant* is located in the heavy residential section of Pembroke Parish, a scant mile from the heart of Hamilton. Consequently there can be no objectionable noise . . . a problem overcome by reducing the intake and exhaust noise levels to a minimum through modern silencing techniques. Exhaust from the big new Nordberg is heard as a deep throated "whisper".

latest 4250 hp Nordberg Unit raises capacity to 15,000 kw

THE Bermuda Electric Light Co., Ltd. is now in its forty-third year of consistent growth and profitable operation. Starting in 1908, their initial installation consisted of a 70 hp producer gas engine coupled to a 50 kw generator.

Today this plant has nine operable Diesel units with a total generating capacity of 15,000 kw. The eighth and ninth units to be added are Nordberg 2-cycle Diesels . . . one 8-cylinder 21" x 31", 3180 hp unit purchased in 1939—and a new 10-cylinder 21½" x 31", 4250 hp unit installed in August, 1950. This latest Nordberg Diesel is the largest unit in the plant and operates a 3300 kw generator at 225 rpm.

In spite of a natural leaning toward English-made equipment, the people in the Bermuda plant are most enthusiastic in their praise of Nordberg Diesels . . . as proved by their repeat order for this latest engine.

Cost for power generation in this plant averages under one cent per kwh, delivered to the power house switchboard . . . which *includes* every item of expense including repairs, operation and maintenance, overtime pay, sick benefits, etc.

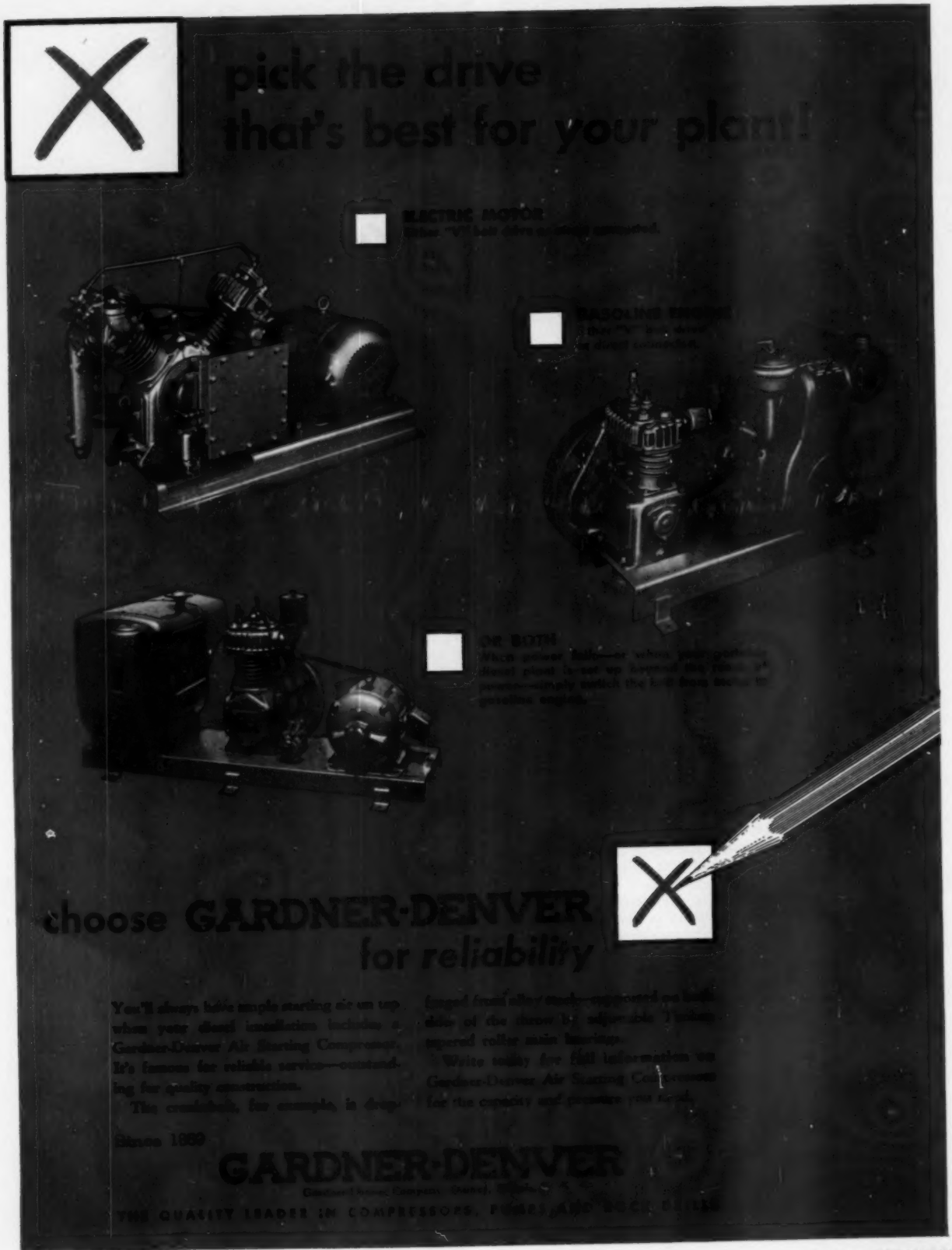
This is just one example of the way in which Nordberg Diesels, in sizes up to 9600 hp, are used to meet the power needs of the world. Write for details, outlining your power requirements.

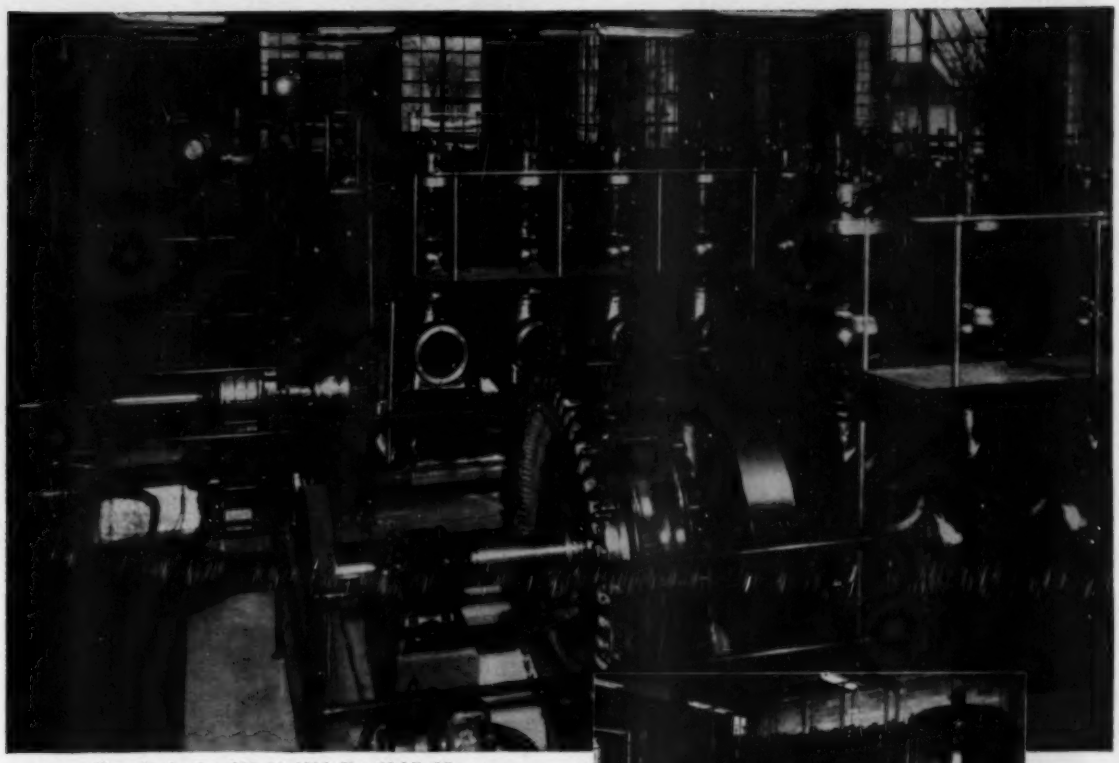
NORDBERG MFG. CO., Milwaukee 7, Wis.

P451

BUSCH-SULZER A DIVISION OF NORDBERG

NORDBERG DIESEL ENGINES


pick the drive
that's best for your plant!
ELECTRIC MOTOR
GASOLINE ENGINE
OR BOTH
choose GARDNER-DENVER
for reliability
GARDNER-DENVER



Above: Interior view of Municipal Light Plant, Madelia, Minnesota.

Right: T. C. Splinter, Superintendent (at right), checks performance of big diesel while S. C. Field of Standard Oil's Mankato office looks on.

Ailing diesels get clean bill of health

As power demands grew, so did trouble for the Municipal Light Plant of Madelia, Minnesota. Carbon formed rapidly in the plant's three diesel engines. Ports required cleaning every two to three weeks. Diesels had to be shut down frequently to free stuck rings and remove varnish from cylinder walls.

T. C. Splinter, plant superintendent, put the problem to a Standard Oil lubrication specialist. The lubrication specialist pointed out that the straight mineral oil used in the engines was not able to stand up under the severe conditions of operation. He recommended a switch to STANDARD HD Diesel Oil.

This heavy-duty lubricant made a clean sweep of the troubles. In four years of hard service, STANDARD HD has kept engines clean and rings free. Port carbon has been reduced to a minimum. Engines are now operated up to 8,800 hours before they are inspected or cleaned. Maintenance costs have been trimmed 30% to 40%.

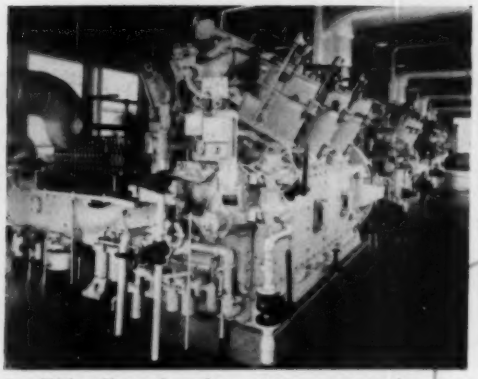
STANDARD HD
TRADE MARK
Diesel Oil

A 1400-hp diesel engine was added to the plant in 1948. This makes a total of 2,840 diesel horsepower now protected by STANDARD HD for this plant.

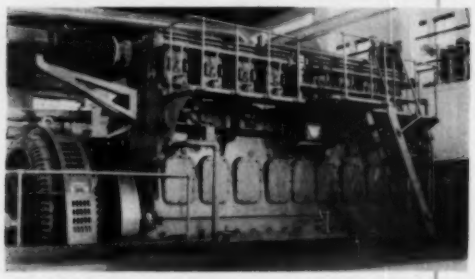
The experience of T. C. Splinter indicates how you can reduce maintenance costs with STANDARD HD Diesel Oil. A Standard Oil lubrication specialist will be glad to help you obtain maximum benefits from this superior diesel oil.

Arrange for his visit, now, by phoning your nearby Standard Oil Company (Indiana) office . . . or write: Standard Oil Company (Indiana), 910 So. Michigan Ave., Chicago 80, Illinois.

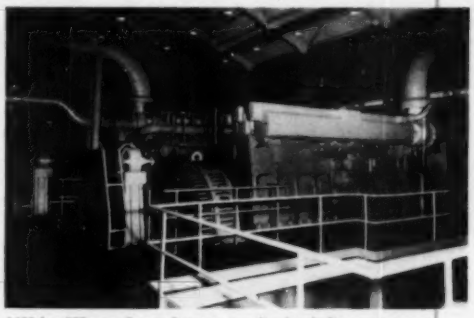
STANDARD OIL COMPANY (INDIANA) STANDARD



Four 330 hp, 400 rpm, Cooper-Bessemer compressors, equipped with Ross lube oil coolers, in a Louisiana refinery compressor station.

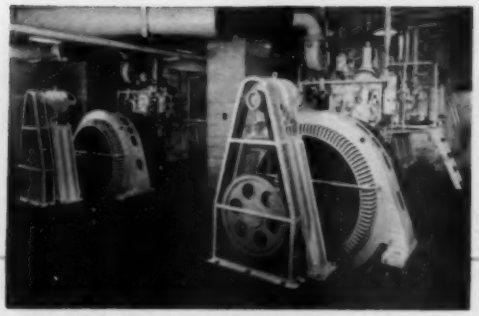


950 hp, 300 rpm, Cooper-Bessemer gas engine, equipped with Ross lube oil cooler, direct-driving generator in a Texas municipal power plant.



1650 hp, 327 rpm, Cooper-Bessemer gas-diesel turboflow engine, equipped with Ross lube oil and jacket water coolers, in an Arizona municipal power plant. Larger Cooper-Bessemer engine in background, also Ross equipped.

Compressor building of a New Mexico natural gas company, housing five, 1100 hp, 300 rpm, Cooper-Bessemer turboflow gas engine compressors, each equipped with Ross lube oil coolers.



Two 485 hp, 400 rpm, Cooper-Bessemer gas-diesel engines, equipped with Ross lube oil coolers, direct-driving generators in a Texas gas company plant.

Peak efficiency, long life and low maintenance of Cooper-Bessemer engines

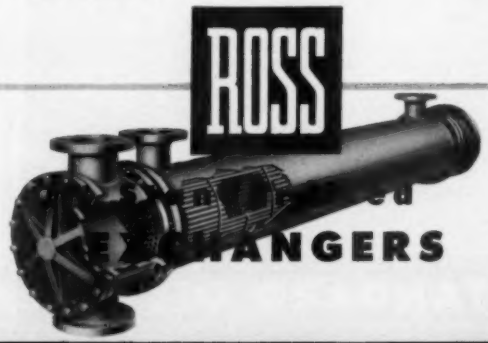
demand exchangers of same qualities

Rugged, work-wise Cooper-Bessemer engines and compressors are widely known for their peak efficiency, long life and low maintenance. And, Cooper-Bessemer is able to successfully maintain such a reputation *only* by demanding of its components the same rigid standards for engineering and manufacture that it insists upon in its own plant.

The consistent use of Ross lube oil and jacket water coolers is an example of this. Cooper-Bessemer, like other famous makers of Diesels and gas engines, has long relied upon Ross Exchangers to carry the burden of temperature protection . . . a responsibility carried out with eminent success.

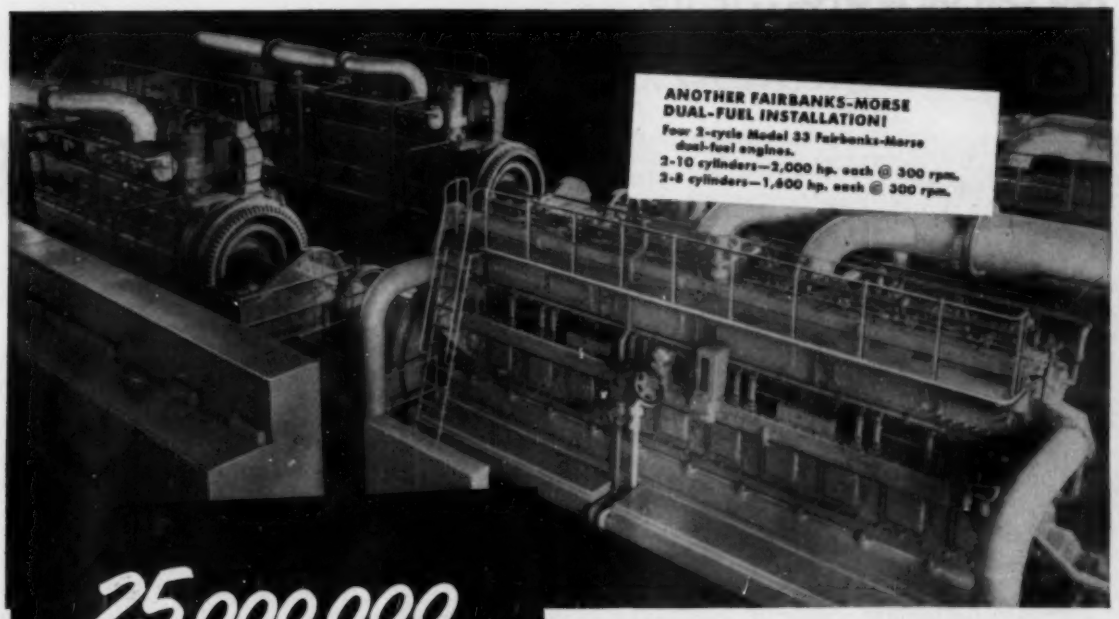
For engines of *any* rating, Ross fully standardized exchangers have unsurpassed advantages. Literature is available with full details. Write.

ROSS HEATER & MFG. CO., INC., Division of American Radiator & Standard Sanitary Corp., 1425 West Avenue, Buffalo 13, N. Y. In Canada, Horton Steel Works, Limited, Fort Erie, Ont.



Serving home and industry

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON


ANOTHER FAIRBANKS-MORSE
DUAL-FUEL INSTALLATION!
Four 2-cycle Model 33 Fairbanks-Morse
dual-fuel engines.
2-10 cylinders—2,000 hp. each @ 300 rpm.
2-8 cylinders—1,600 hp. each @ 300 rpm.

25,000,000 LOW COST Kw-h per YEAR with FAIRBANKS-MORSE DUAL FUEL POWER!

The basic and important economies of Fairbanks-Morse dual-fuel engines are amply evident in the first year's record of this 7200 hp. installation. Here are a few facts that should interest anyone who wants low-cost, unfailing power generation.

Plant requirements of 5600 hp. are met with three engines running at full load, one held in reserve . . . units in operation must run at an overload before the operator starts up another engine . . . frequently, electrical equipment is started across the line, pulling an estimated 500% overload . . . in one year there has not been a single shutdown due to engine failure . . . in six months the engines ran a combined total of 13,816 hours out of a possible 17,520 . . . engines can operate either as full diesels or on natural gas and can be switched instantly from one fuel to the other.

Look over these facts—then look into the matter of gaining the economies of dual-fuel operation in *your* plant. When you do, remember that there are more Fairbanks-Morse dual-fuel installations than any other—that Fairbanks-Morse has more dual-fuel experience—and that field conversion parts are available for many sizes and types of Fairbanks-Morse diesel engines. Write your nearest Fairbanks-Morse branch office or Fairbanks, Morse & Co., 600 South Michigan Avenue, Chicago 5, Illinois.

Look at this Six Months Performance Record!

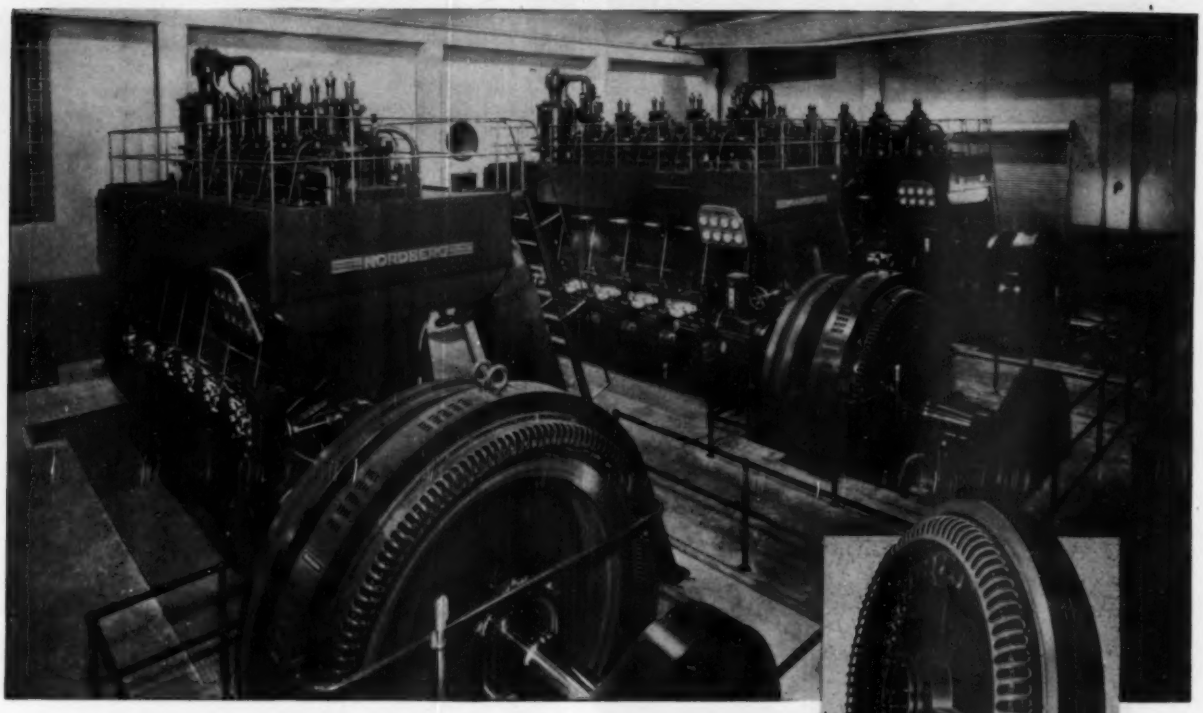
1950	Kw-h Generated	Gas, MCF	Cu. ft. gas per kw-h	Fuel oil (Gals.)	Engine #1 2000 hp.	Engine #2 1600 hp.	Hours #3 2000 hp.	Hours #4 1600 hp.	Lube Oil (Gals.)	Hp. hrs. per gal lube
JULY	2,305,100	25,505	11.06	15,489	682	597	606	530	984	4,450
AUG.	1,931,300	21,814	11.29	13,235	568	503	503	558	831	4,613
SEPT.	2,116,800	22,507	10.63	15,698	613	539	642	525	891	4,709
OCT.	2,174,900	23,769	10.92	15,300	607	576	577	587	894	4,741
NOV.	1,913,800	21,225	11.09	15,909	538	578	449	584	931	4,117
DEC.	2,333,800	25,157	10.73	18,596	666	517	656	615	891	5,000
Total	12,775,700	139,977		94,227	3,674	3,310	3,433	3,399	5,422	4,601

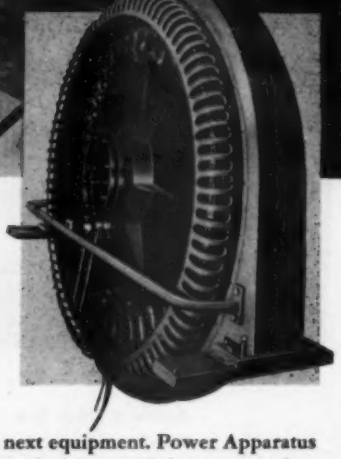
FAIRBANKS-MORSE,
a name worth remembering

DUAL FUEL AND DIESEL ENGINES • ZC ENGINES • PUMPS
ELECTRIC MOTORS • LIGHT PLANTS • GENERATORS • SCALES

YOU CAN BE **SURE**.. IF IT'S

Westinghouse





Tough load problem solved with Westinghouse A-C Generators

A large western cement plant needed generating units to supply its power requirements including a 1000-hp motor. Starting motors this size puts a heavy load on the generators . . . causes considerable voltage drop. But, voltage drop had to be minimum. Consequently, standard generating units couldn't do the job. The diesel manufacturer—supplier of the complete unit—asked Westinghouse to build special generators to handle the job. The results are pictured above—another successful Westinghouse A-C Generator installation.

This example shows the problem-solving ability Westinghouse offers in building special generators for unusual applications.

Make certain you get the benefit of Westinghouse engineering on your next equipment. Power Apparatus Specialists—in principal cities—will help you select and apply the right equipment to the job. Consult them for any present or future plans.

Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21572

Westinghouse

DIESEL ENGINE DRIVEN AC GENERATORS

If you manufacture:

Combines
Compressors
Concrete Mixers
Conveyors
Cranes
Crushers
Farm Machinery
Generators
Hammer Mills
Hoists
Marine Auxiliary Units
Mining Equipment
Pumps
Refrigeration Equipment
Road Rollers

PETTER DIESELS *will cut your costs and give you proved, dependable power!*

MODEL AV2 — 4-cycle, 12 hp, 2-cylinder, 1800 rpm, vertical, water-cooled industrial diesel engine.

PETTER *WATER-COOLED* DIESEL ENGINES. Available in two basic 4-cycle models. Series AV-3 to 12 hp. Series B-12 to 36 hp. Thermo-syphon tank cooling or radiator. Hand or electric starting without difficulty, even under sub-zero conditions.

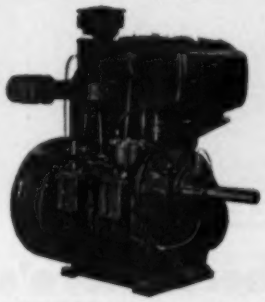
Type	HP Cont.	RPM	BORE in.	STROKE in.	LENGTH in.	WIDTH in.	HEIGHT* in.	WEIGHT lbs.
AV1	3/6	1000-1800	3.15	4.33	29.75	20.375	36.625	406
AV2	6/12	1000-1800	3.15	4.33	36.5	20.625	36.625	598
B2T	12/18	1000-1500	4.33	4.33	33	24	41.375	1198
B3T	18/27	1000-1500	4.33	4.33	39.125	24	41.75	1477
B4T	24/36	1000-1500	4.33	4.33	45.75	24	41.25	1737

*With radiator

Petter

PETTER *AIR-COOLED* DIESEL ENGINES. Series AVA–3 to 10.5 hp in one and two-cylinder models. Air-cooled by flywheel fan and ducting over finned cylinders and cylinder heads. Light weight, low overall dimensions. Hand or electric starting. Full-speed drive from either end, or half-speed drive from timing-gear end. Totally enclosed, but easily accessible. Dependable operation under any climatic conditions. Direct injection with an open combustion chamber insures easy starting.

Type	HP Cont.	RPM	BORE in.	STROKE in.	LENGTH in.	WIDTH in.	HEIGHT in.	WEIGHT Lbs.
AVA1	3/5.25	1000-1800	3.15	4.33	29.75	21	28.125	390
AVA2	6/10.5	1000-1800	3.15	4.33	36.5	21	31.75	558



MODEL AVA2—4-cycle, 10.5 hp. 2-cylinder 1800 rpm, vertical, air-cooled industrial diesel engine.

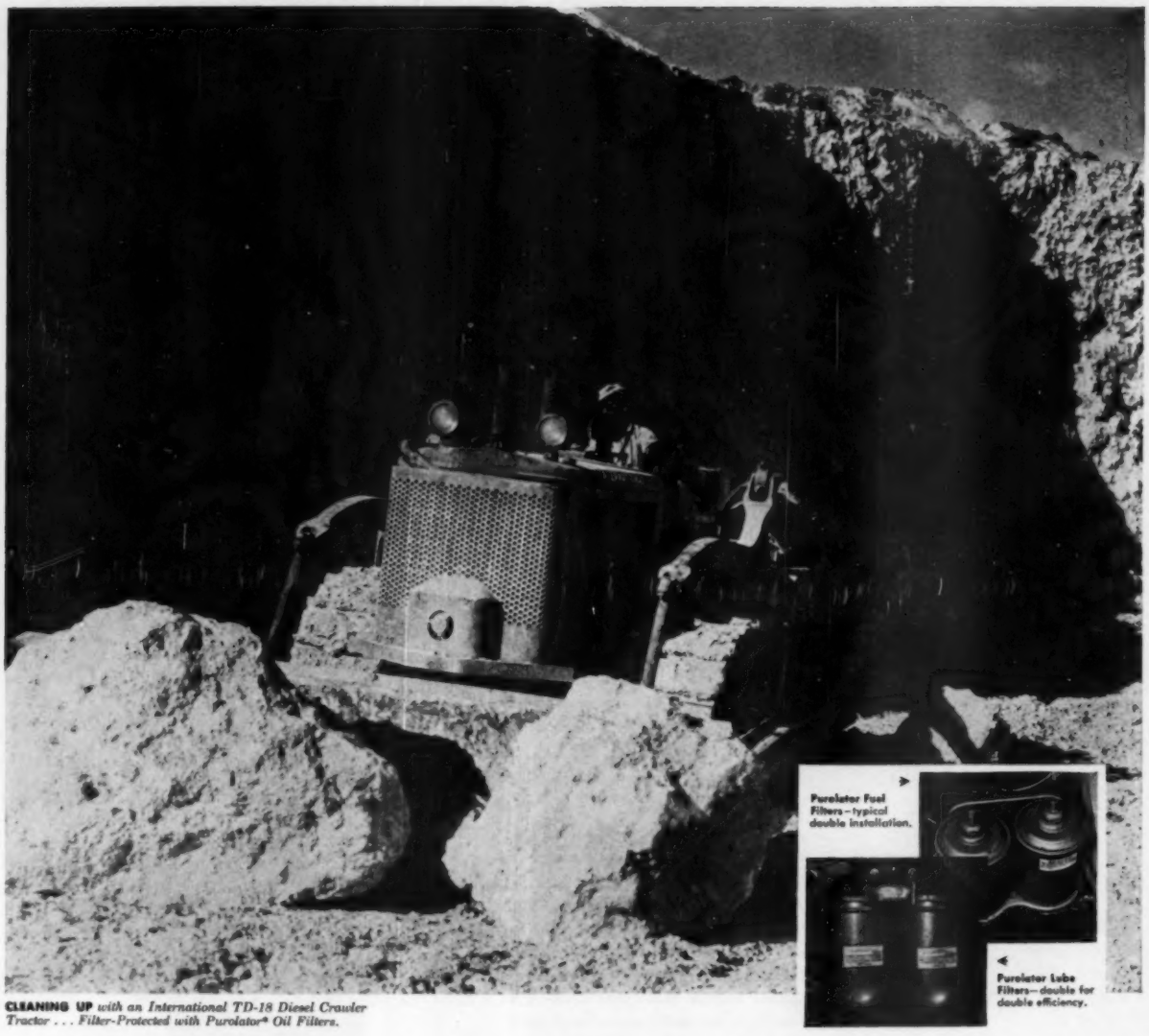
ABOE DIESEL

ABOE, Inc.
Empire State Building
350 Fifth Avenue
New York 1, N. Y.

1500 Petter Diesel Engines are produced each week . . . and stocks are held throughout the U.S.A.

Petter parts and service are available in over 100 countries . . . to service your equipment abroad.

Write us today for full facts as to why Petter Diesels will cut your costs and give your equipment proved, dependable power.



CLEANING UP *with an International TD-18 Diesel Crawler Tractor . . . Filter-Protected with Purolator* Oil Filters.*

Where there's rock, there's dust . . .

AND WHERE THERE'S DUST, there's engine-trouble unless there's *filter-protection.*

For engines breathe dust and dirt with every turn of the crank shaft—need fuel and lube-oil filtration to protect cylinder walls, bearings and fuel systems.

For filter protection: rely on the Purolator Micronic*. Purolator's element traps abrasives measured in microns (.000039 of an inch) . . . has a revolutionary accordion-pleated design which provides a filtering area as much as 10 times that of old-style filters . . . won't warp or disintegrate.

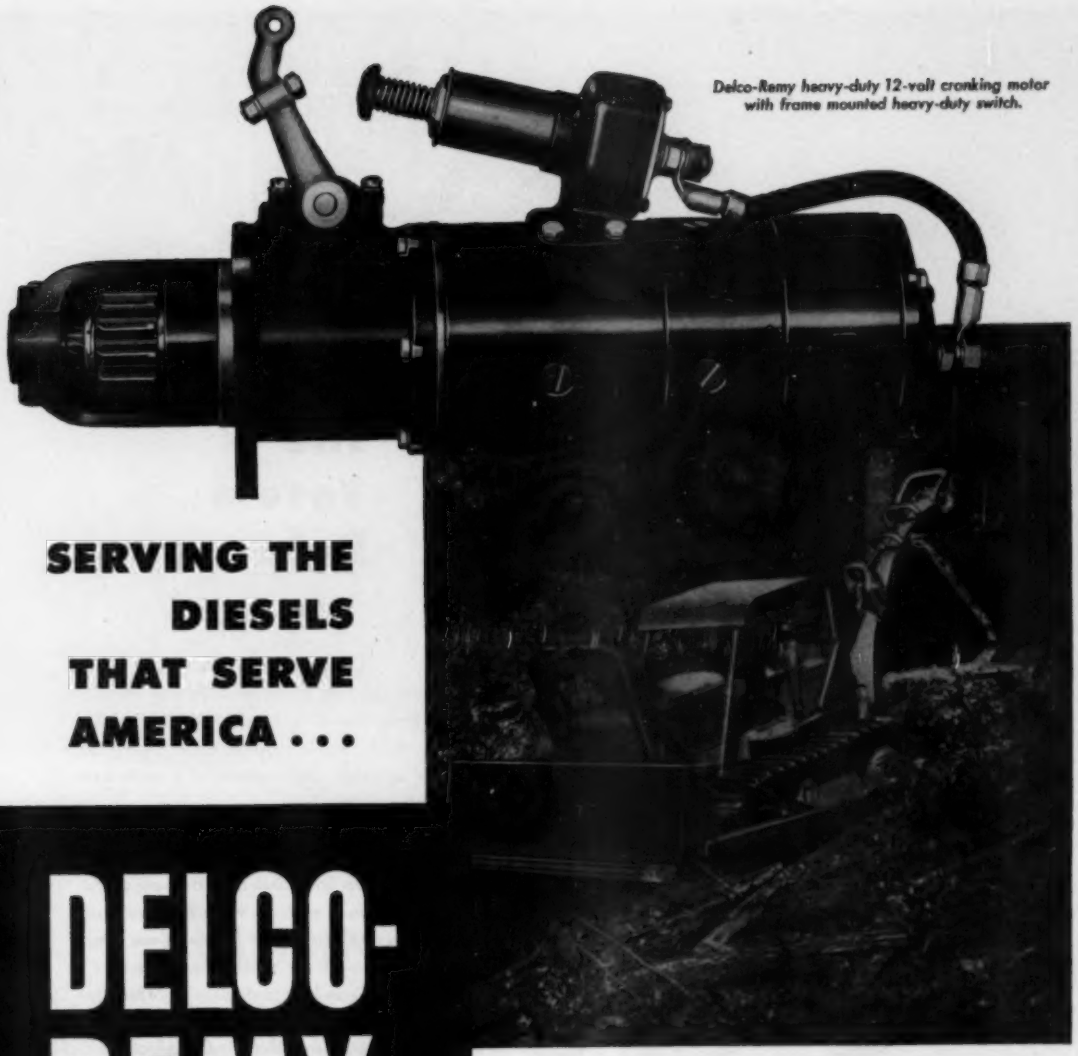
Whatever your filtering problem, let our engineering staff show you how to solve it!

*Reg. U. S. Pat. Off.

Protect your Power with...

PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"

PUROLATOR PRODUCTS, INC. • RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA • FACTORY BRANCH OFFICES: CHICAGO, DETROIT, LOS ANGELES



Delco-Remy heavy-duty 12-volt cranking motor with frame mounted heavy-duty switch.

SERVING THE DIESELS THAT SERVE AMERICA . . .

DELCO-REMY

Diesel engines have been adopted for scores of applications, because Diesels have proved themselves to be dependable, economical sources of power. And Delco-Remy electrical equipment fills the electrical needs of many of these Diesel engines.

Manufacturers and users of Diesel engines have learned through experience that Delco-Remy helps to keep Diesels on the job.

UNITED SERVICE MOTORS

DELCO-REMY—A UNITED MOTORS LINE
Service Parts and Delco Batteries
Available Everywhere Through
UNITED MOTORS DISTRIBUTORS

Delco-Remy
DIVISION, GENERAL MOTORS CORPORATION
ANDERSON, INDIANA

DELCO-REMY • WHEREVER WHEELS TURN OR PROPELLERS SPIN

High Man on the Totem Pole

From the origin of Twin Disc Clutches and Hydraulic Drives on the *drafting board* . . . into all stages of *manufacture* . . . prime consideration is given to the ultimate requirement of trouble-free service in the field.

All are rated conservatively to further assure minimum maintenance requirements.

But when downtime does become necessary, the man with the wrench in his hand can devote it to *repair* time and not *hunt-and-wait* time for replacement parts . . . because Twin Disc maintains *seven* factory-branch parts stations, plus 56 well-stocked and strategically located parts depots.

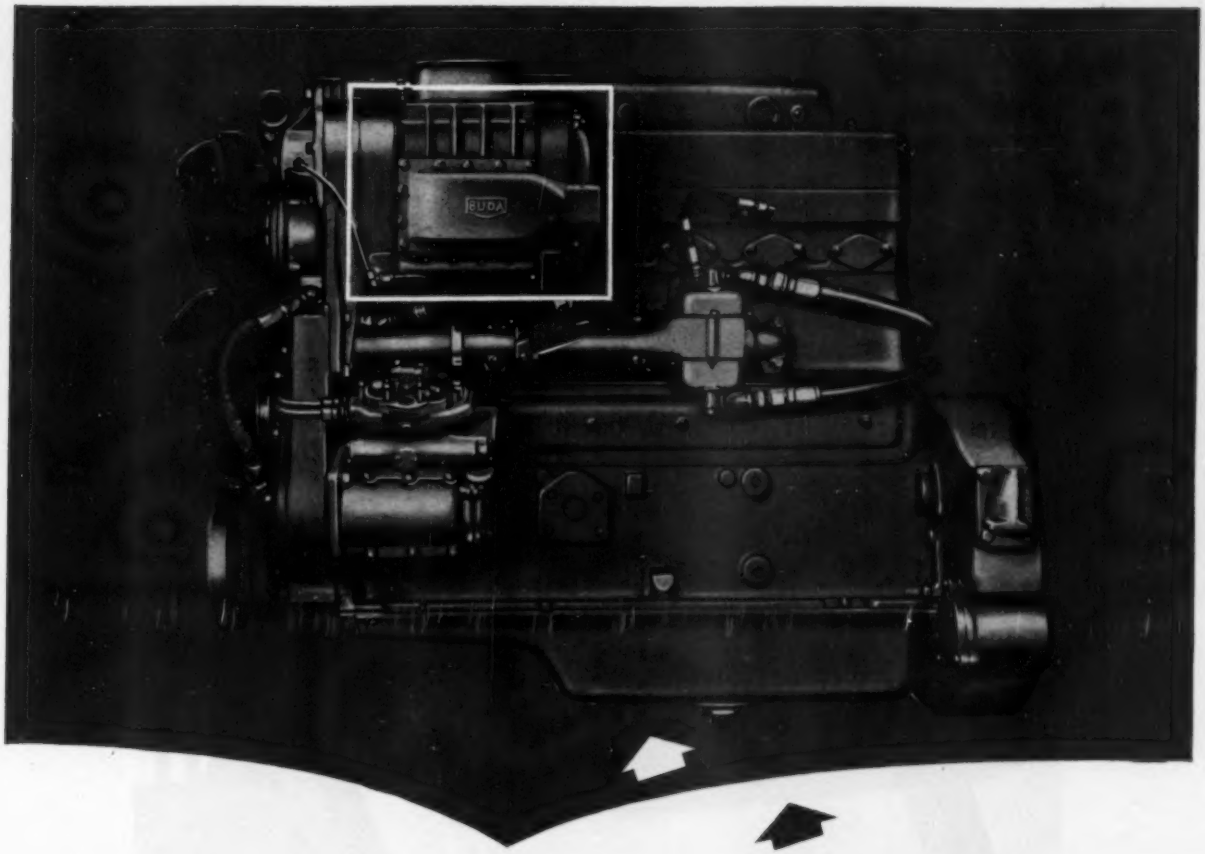
That's why, to be sure of performance—*and service*—always specify Twin Disc Clutches and Hydraulic Drives.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

Clutches & Hydraulic Drives

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA



BUILT-IN POWER

BUDA Diesels use B-W Superchargers built in for added horsepower and economy

The Buda Company of Harvey, Illinois, uses B-W Superchargers on their diesels. This recently released automotive diesel engine, Model 6-DTS-468, develops 150 brake horsepower at 2,400 r.p.m. Designed for heavy-duty truck operation both at sea level and altitude. The supercharger on this engine is one of a standard line developed by Pesco Products Division.

For motor truck, marine, railway or general industrial applications, supercharging means savings in engine space and weight . . . means power to pull heavy loads . . . means sea level operation at high altitudes. All these extra benefits without corresponding increases in operating costs.

The engine manufacturer who wants to pack more power into a given engine size . . . or who wants to add an entire new series of models to his line without retooling or the expense of redesign, can do so simply by equipping his present line with B-W Superchargers. One of our engineers will gladly explain how this can be done. There is no obligation. Write today to:

engineering Pesco production

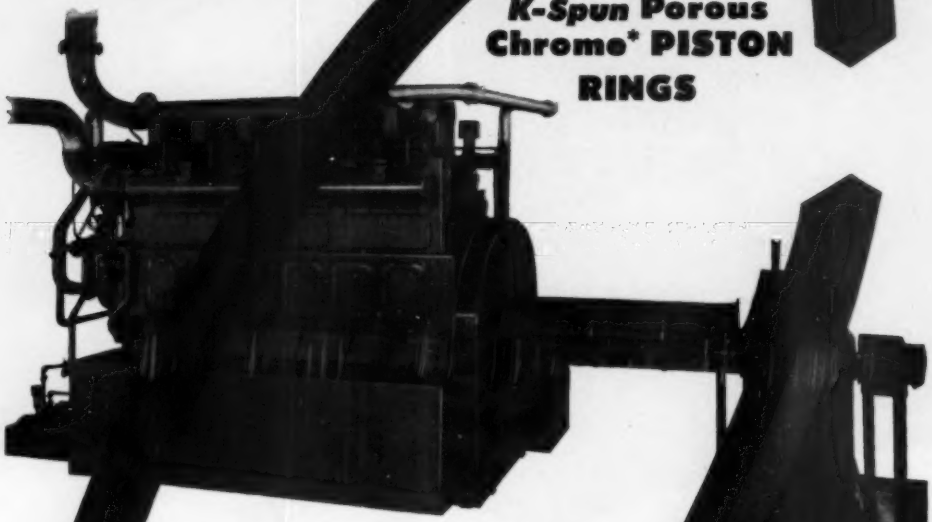
PRODUCTS DIVISION

BORG-WARNER CORPORATION

24700 NORTH MILES ROAD BEDFORD, OHIO

UNION OIL COMPANY
cuts cylinder wear, lengthens service of equipment with...

... KOPPERS *K-Spun* Porous Chrome* PISTON RINGS



Koppers K-Spun Piston Rings, produced by an exclusive centrifugal casting process, are 100% stronger and four times more resistant to combustion shock than ordinary cast iron rings, and will not break in installation or in service.

Koppers Porous Chrome Rings have a porous chrome surface that holds and distributes oil during break-in, quickly wears down to perfectly seated solid chrome that prevents grit and other particles from embedding in the ring surface where they can scratch cylinder walls. Porous Chrome Rings last up to four times as long as other rings, reduce cylinder wear 50% or more.

That's why hundreds of companies like Union Oil are reporting amazing savings in equipment and maintenance costs through the use of Koppers Rings. Remember . . . we make rings for *anything* that uses piston rings.

If you have a piston ring problem, why not get the *right* answer from us? Write, wire or phone KOPPERS CO., INC., *Piston Ring Dept.*, 1584 Hamburg St., Baltimore 3, Maryland.

Union Oil Company's newly modernized Avila (California) Terminal utilizes three 450 h.p. Enterprise dual-fuel engines with single-stage Ingersoll-Rand SHV centrifugal pumps. Engines are 6 cylinder, 12" bore, 15" stroke, 4 cycle, 450 rpm, non-supercharged. Each piston is fitted with two Porous Chrome, three tapered and two oilcutter Koppers Piston Rings.

KOPPERS

KOPPERS
AMERICAN HAMMERED
PISTON RINGS

*VAN DER HORST PROCESS

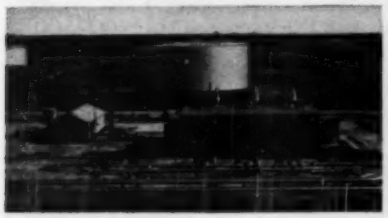
ONLY KOPPERS CAN FURNISH K-SPUN OR POROUS CHROME!

Here's real pumping power for Pipe Lines

Alco Diesel engine pumping installation at Patoka Station of The Texas-Empire Pipe Line Company System uses NO spare units.

Operation of these Alco diesels is so reliable that the Patoka Illinois Station uses no spare units—and yet must be ready at all times to pump vital crude oil by pipe line to refineries and connecting carriers. That's why Alco medium speed Diesels have been picked for the job. These dependable engines have operated 96% of the elapsed time at 94% of the manufacturer's rating, using centrifuged line crude for fuel. Operation is so reliable that the station uses no spare units. Such dependable performance is the chief reason why in the last ten years *more Alco Diesels have been installed in oil pipe line pumping service in the U. S. and Canada than any others.* For more details check now with American Locomotive Company, 30 Church Street, New York 7, or the nearest Alco Sales Office at Beaumont, Chicago, Cleveland, Houston, Kansas City, San Francisco, Schenectady, St. Louis.

Outside view Patoka Pumping Station



Close-up view of one of the Alco Diesels at Patoka

Three Alco Diesels pumping crude at Patoka

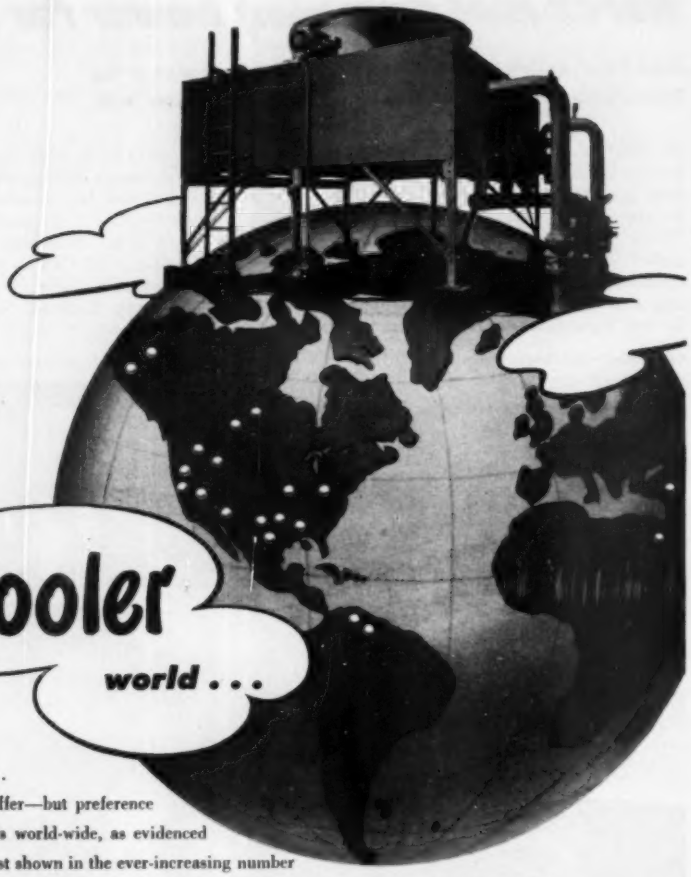
SPEED Vs. WEAR

Remember, since piston speed and journal travel per minute are both almost the same in medium speed and slow speed engines, wear is equivalent as well. Not only do you get unequalled dependability with Alco Diesels—you get long wear and low maintenance costs, no matter how difficult the service conditions.

ALCO DIESELS

THE MARK OF MODERN ENGINEERING

AMERICAN LOCOMOTIVE COMPANY



from
Arizona
to
Arabia

it's a
DriCooler
world . . .

Climates vary . . .
cooling requirements differ—but preference
for Marley DriCoolers is world-wide, as evidenced
by the exceptional interest shown in the ever-increasing number
of DriCooler installations throughout the world. Consider all factors — weather conditions, fluid
to be cooled, horsepower required, influence of corrosion, and many more —
and you'll find that Marley offers you the best, most economical dry cooler for your specific job.

This is so because Marley makes a *complete* line of DriCoolers in a wide range of capacities
and designs; because each Marley DriCooler is *engineered for the job*, whether it
be to cool jacket water in the Arctic or lube oils in the burning desert.

There's a Marley application engineer in every major city, whose
services and experience are yours for the asking. Call your Marley man for full
details or write for Bulletin DC-50.

Also producers of
AQUATOWERS
VAIRFLO TOWERS
DOUBLE-FLOW TOWERS
NATURAL DRAFT TOWERS
SPRAY NOZZLES

MARLEY

The Marley Company, Inc.
KANSAS CITY 15, KANSAS

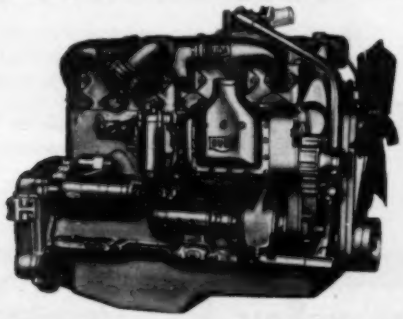
Get MORE POWER and LUGGING ABILITY into your earth-moving equipment and move dirt at lower cost per yard.

BUDA dyna-swirl DIESELS GIVE YOU:

- 15-20% more power at the crankshaft
- 10-15% more piston displacement
- 10-20% more lugging ability
- Dyna-Swirl Combustion—lower fuel cost per horsepower

PLUS up to 6000 or more hours operation before overhaul!

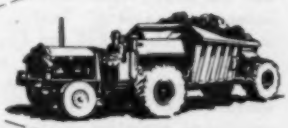
Get *all* the facts on Buda Diesels from your nearby Buda Distributor today. He can show you how Buda Diesels give you more horsepower hours per dollar. Write for Bulletins, data and Specifications. The Buda Company, Harvey, Illinois.



NEW BUDA *dyna-swirl* DIESELS FOR

SCRAPERS

DOZERS



WAGONS

BC-10

a Power-Full and Dependable Name in Engines...

BUDA

ACROSS THE YEARS

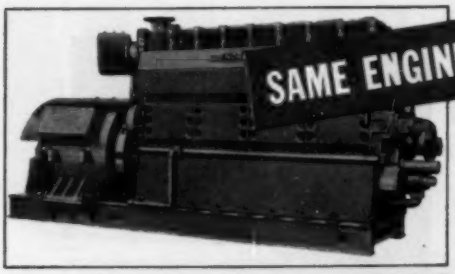
A Reputation for DEPENDABLE, PRECISION WORKMANSHIP ERIE CRANKS!

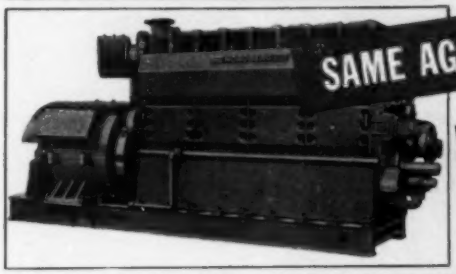
DURING the past half-century Erie Forge has built a reputation for dependable, precision workmanship. This period of time has seen many changes in the diesel industry . . . new designs, methods and materials. And during that same period Erie Forge has kept abreast of new developments . . . constantly striving to maintain or improve its high level or precision workmanship.

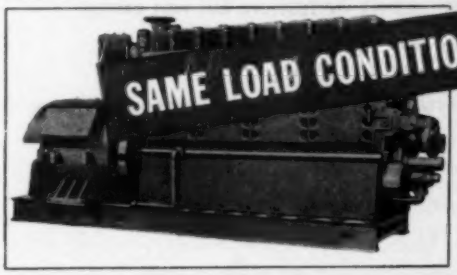
One control—one responsibility is the watch word at Erie Forge. From the raw material to the finished crank the work is under the watchful eyes of our engineers whose job it is to see that every finished product conforms to the high standards of Erie Forge craftsmanship.

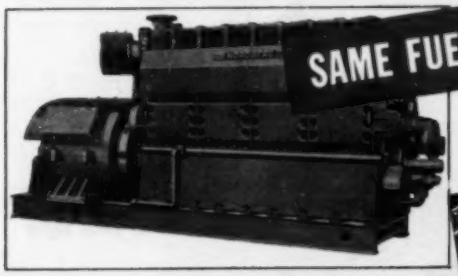
Consult with our engineers. Together we will find the right answer.

ERIE FORGE COMPANY, ERIE, PA.









Yet Lubrication is Different!

Yes, it's not unusual. From the first day in service, every engine begins to develop its own lubricant "diet." Frequently it's a matter of care and attention given by the operator. Often it's caused by geographic or climatic differences. Certainly, no two engines ever built performed identically . . . wore out at the same time . . . or required the same amount and kind of lubricant for best performance.

For these reasons *your* Diesel engine investment should be protected with regular lubrication engineering service. A Cities Service representative is highly skilled, highly trained and thoroughly familiar with the lubrication requirements of every type of Diesel equipment. Moreover, behind him stands an alert, completely integrated oil company with a full line of top quality industrial lubricants. Contact the office nearest you or write below for further information.

A Complete Line of Top Quality Petroleum Products Including:

- **New Heavy Duty Diesel Oils**
- **New Low Speed Diesel Oils**
- **Exclusive Diesel Engine Oils**
- **Exhaust Analyzer Service**

FREE! THIS HELPFUL BOOKLET

CITIES SERVICE

SERVICE

QUALITY PETROLEUM PRODUCTS

CITIES SERVICE OIL COMPANY
Sixty Wall Tower, Room 920
New York 5, N. Y.

Please send me without obligation your new booklet entitled "Diesel Engine Lubrication."

*Name*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

CYCLAN

THE NEW PISTON RING MATERIAL FOR TOUGH SERVICE IN HEAVY DUTY DIESEL AND GAS ENGINES

1 *Cyclan* **IS TOUGH,**

WITH PLENTY OF TENSION, BUT NOT BRITTLE

2 *Cyclan* **HAS TWICE THE BREAKAGE RESISTANCE**

OF ORDINARY IRON

3 *Cyclan* **WILL NOT CHANGE**

STRUCTURALLY UNDER HEAT

4 *Cyclan* **WITHSTANDS IMPACT, HAMMERING, FLEXING**

5 *Cyclan* **WITHSTANDS**

CONSIDERABLE DISTORTION WITHOUT LOSING SHAPE

6 *Cyclan* **RESISTS WEAR FAR BETTER**

THAN STANDARD RING IRON

Write for complete information

SEALED POWER CORPORATION
MUSKEGON, MICHIGAN

Sealed Power

PISTON RINGS · PISTONS
CYLINDER SLEEVES

MACK

1st

IN DIESEL TRUCK SALES

Of all diesel-powered trucks sold in the United States during 1950 . . . **better than one out of every three was a Mack** . . striking evidence of Mack's top-ranking position in diesel truck sales. The country over, more and more truck owners are discovering the advantages of thrifty Mack diesel-powered trucks . . . the big savings they give in more miles per gallon at less cost per gallon. In the face of constantly rising costs, these progressive operators find that it is indeed profit-wise to dieselize with Mack.

Be Profit-Wise...Dieselize with

Mack TRUCKS

outlast them all

Mack Trucks, Empire State Building, New York 1, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

IVAN is watching you

IVAN is a dyed-in-the-wool Communist. There are only 6 million party members like him in all Russia, yet these Communist brass-hats enforce the iron dictatorship of the Kremlin over *200 million* Russians.

He's sold to the hilt on Red ideas. Which means he's out to get you. He believes it's either you or him . . . that the world is too small for both.

Ivan is working hard to beat you down. He has a big head start.

Right now he's got you in a bad spot.

Ivan is afraid of only one thing.

He fears your ability to out-produce him in guns, tanks, planes.

Frankly, he doesn't think you value your free system enough to do it . . . to make willingly the sacrifices he has squeezed out of the Russians.

But he's wrong!

Because you and all of us have set out to build more and better weapons—to do it faster all the time.

We must use every bit of know-how and inventive skill we have to improve our machines and methods—to turn out more and more for every hour we work. Only in this way can we become militarily strong.

But we've got to supply essential civilian needs as well. We can't allow needless shortages to take prices skyrocketing and lower the value of our dollar.

Sure, that means sacrifices for everybody. But doing this double job well is the only sure way to stop Ivan in his tracks—and to save the freedoms which are ours and which he has never known.

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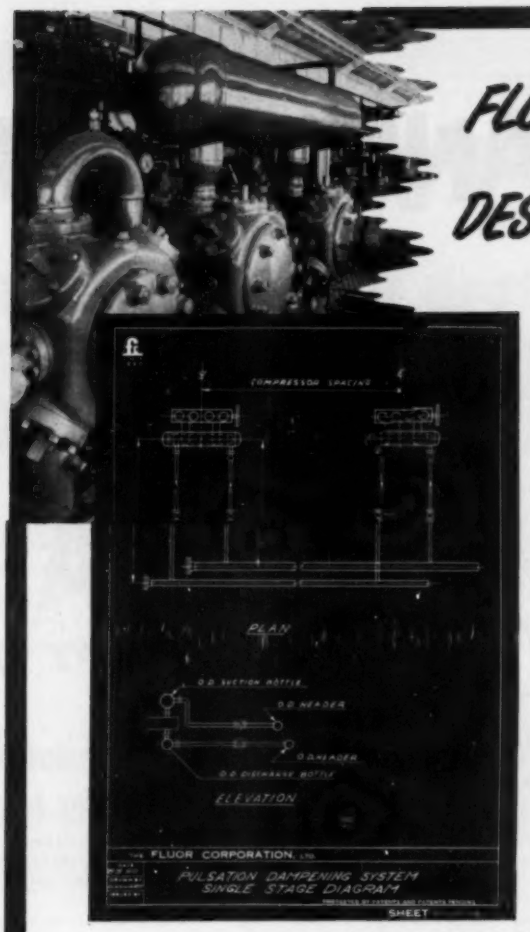
THE BETTER WE PRODUCE
THE STRONGER WE GROW

Editor—DIESEL PROGRESS



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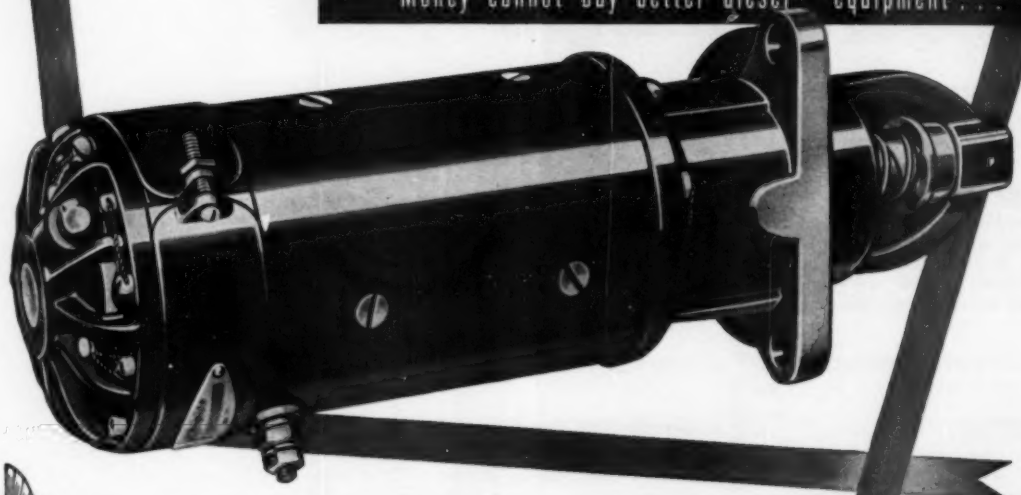

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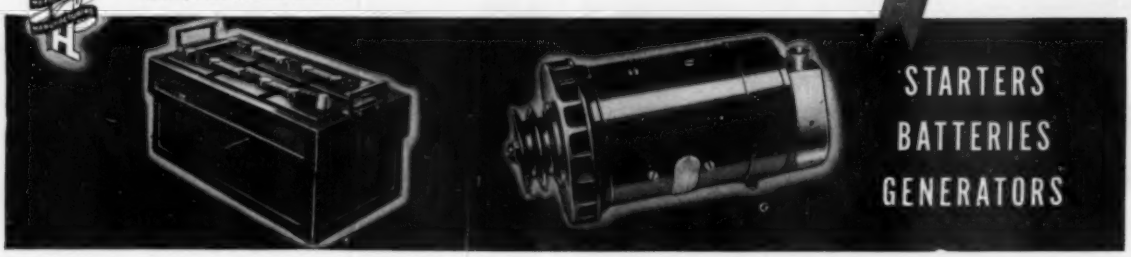

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CONTENTS FOR APRIL, 1951

Crumal Shows Service Wins 33
Diesels in a Paper Mill 37
Diesels Police The Beach 40
Bermuda 44
Cargo Ship *Michigan* 50
Big Diesel Trucks 52
Crankshaft Regrinding 56
Tug *Beauregard* 58
High-Speed Diesels . . . Design, Operation and Maintenance 60
Research With a Sporting Flavor 62
What's Going On In England 64
Diesels Supply Western Railroads 66

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CRUMAL SHOWS SERVICE STILL WINS

Peter Kiewit Sons Co. Demands Country Texaco Distributor for Three Multiple-Million-Dollar Irrigation Canal Construction Jobs — or Else!

By F. HAL HIGGINS

SERVICE by the oil industry has been notably above and beyond the level of retail merchandising in U. S. post-war years. That the speed with which the gas stations snapped back to pre-war courtesy and service following end of war was not merely a show for the gals at the wheels of the touring and local marketing autos is seen in more rugged spots. Your Old Reporter has noted this high regard of the best traditions of American industry by oil field products in every area he has visited since war's end from Texas to Seattle and in between. It is not restricted to any particular line of oil field products, nor to any area. But when seen out on the frontiers of construction, logging and ranching it at first glance seemed worthy of a second look. But recently, he encountered a country distributor who is doing such a job of service with his Texaco products in a farm area, that he and his product not only dominate the farming area alloted to him by one of the great oil producers and refiners, but his service so won a great irrigation construction firm with a contract to dig across the distributor's territory that it demanded that his Texaco trucks should follow their construction crew across neighboring territories. "If we can't get Crumal's service, we are not so fussy about what name is on the product," summarized the Peter Kiewit Sons' Company officials.

Old Cow Hand Sells Service with Oil — Porterville is not the bustling, mushrooming type of town like so many in post-war California. It is growing, but you can recognize it as the same place after an absence of two or three years. Max Crumal's office is right behind his gas station on the main street near the heart of Porterville. Max doesn't impress the casual first time visitor as a go-getter until he gets out to the ranchers. The cowmen know their kind when they see them. Max is one of them the minute he gets on a ranch with livestock. The first farmer we encountered in getting our Texaco story was a cotton-Hereford rancher whose herd had been started from foundation stock from Crumal's herd. When the oil tank truck rolled up and backed into the corner of the machine shop to unload the regular needs in Havoline, Marfak, gear oil, Fire Chief gas and diesel fuel, the talk was all on the two young registered Hereford bulls being fitted for the coming sale at Tulare. The ranch hands led out the white-faced royalty and rancher and oil distributor talked Herefords. An Arabian colt with a fancy name right out of the sand-kissed Mohammedan deserts was led up for inspection. Max was again right at home in discussing the fine points of this aristocrat of the equine world. Off across the pasture grazed a flock of registered sheep. The oil man knew his mutton and wool on the hoof and insisted on the visitor coming over to his little ranch on the edge of Porterville where his horses and registered sheep were grazing on the lush pasture back of his new modern home. Finally, the two International cotton pickers were run out to the cotton field and posed for pictures in spite of wet weather having stopped cotton harvest. It was interesting to note how the heavy diesel and gas equipment was being worked in a close-knit team for harvest and chopping down of stalks with soil mulch right behind the pickers. Two Allis-Chalmers HD crawler tractors were handling heavy disks following the cotton pickers to chop the cotton stalks into soil mulch. It was nicely balanced farming with no plans to go hog-wild on cotton next year when all acreage controls are off and a big increased acreage is sure to follow as 40-cent cotton lures the old style short-sighted farmer into a one-crop plunge.

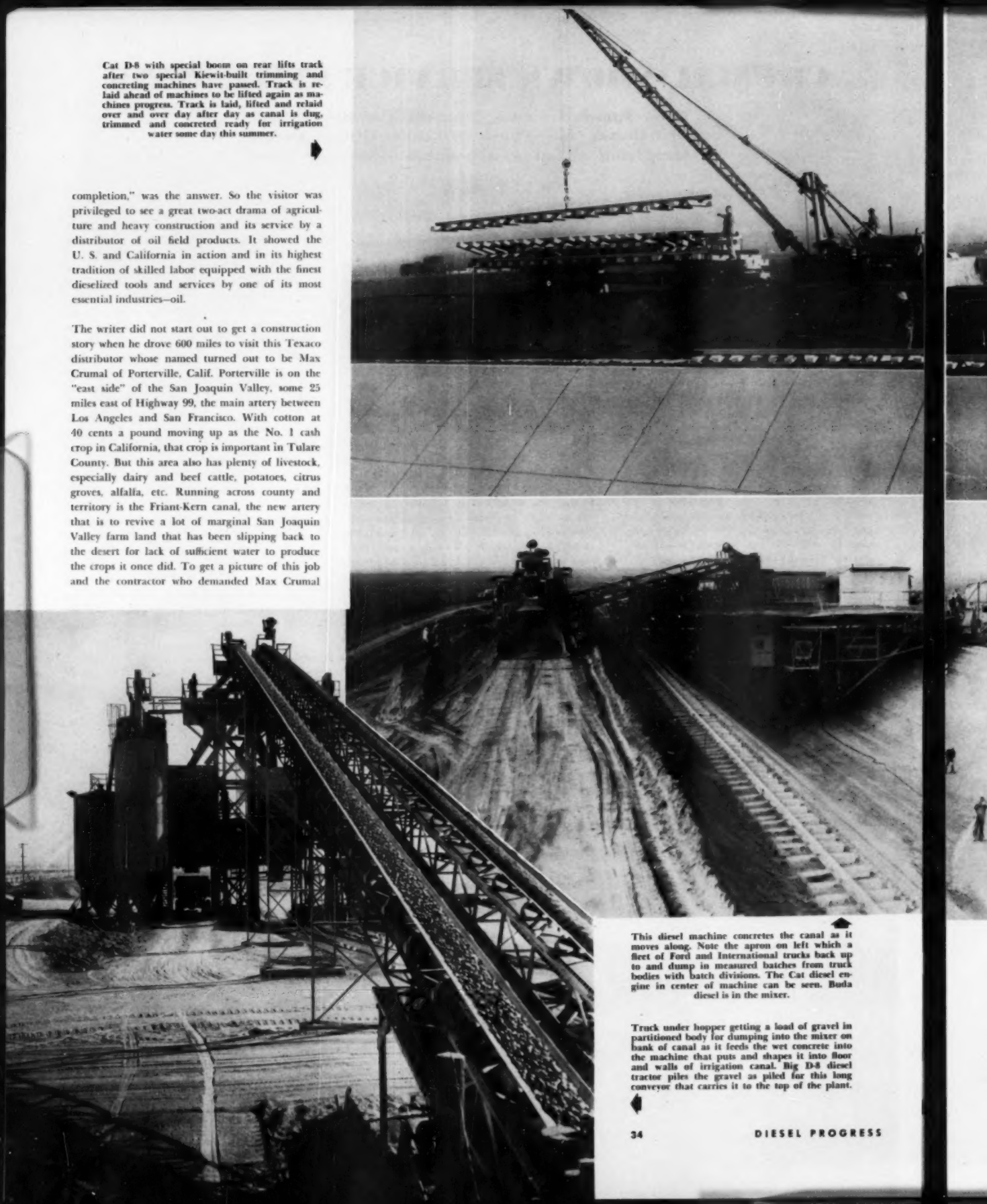
"Would you like to see the Peter Kiewit construction job, which I have been servicing from here on all its four contracts?" asked Mr. Crumal as we met in his office. "Let us see your rancher with cotton and cattle and then we will take a look at the Kiewit job. I haven't been on that big irrigation canal construction for three years and would like another look at it down here near its

Max Crumal's farm on edge of Porterville, Calif., where he raises pure-bred sheep and Arabian horses.

Cat D-8 with special boom on rear lifts track after two special Kiewit-built trimming and concreting machines have passed. Track is relaid ahead of machines to be lifted again as machines progress. Track is laid, lifted and relaid over and over day after day as canal is dug, trimmed and concreted ready for irrigation water some day this summer.

completion," was the answer. So the visitor was privileged to see a great two-act drama of agriculture and heavy construction and its service by a distributor of oil field products. It showed the U. S. and California in action and in its highest tradition of skilled labor equipped with the finest dieselized tools and services by one of its most essential industries—oil.

The writer did not start out to get a construction story when he drove 600 miles to visit this Texaco distributor whose named turned out to be Max Crumal of Porterville, Calif. Porterville is on the "east side" of the San Joaquin Valley, some 25 miles east of Highway 99, the main artery between Los Angeles and San Francisco. With cotton at 40 cents a pound moving up as the No. 1 cash crop in California, that crop is important in Tulare County. But this area also has plenty of livestock, especially dairy and beef cattle, potatoes, citrus groves, alfalfa, etc. Running across county and territory is the Friant-Kern canal, the new artery that is to revive a lot of marginal San Joaquin Valley farm land that has been slipping back to the desert for lack of sufficient water to produce the crops it once did. To get a picture of this job and the contractor who demanded Max Crumal

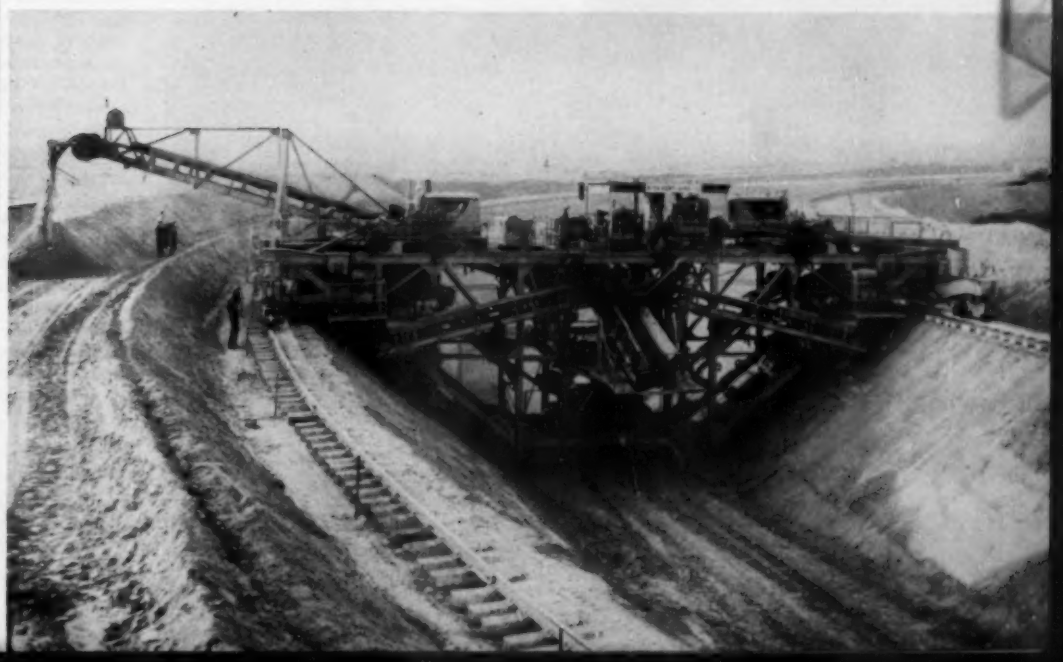


This diesel machine concretes the canal as it moves along. Note the apron on left which a fleet of Ford and International trucks back up to and dump in measured batches from truck bodies with batch divisions. The Cat diesel engine in center of machine can be seen. Buda diesel is in the mixer.

Truck under hopper getting a load of gravel in partitioned body for dumping into the mixer on bank of canal as it feeds the wet concrete into the machine that puts and shapes it into floor and walls of irrigation canal. Big D-8 diesel tractor piles the gravel as piled for this long conveyor that carries it to the top of the plant.

Crumal's Texaco truck has heavy going in delivering the Texaco service to every piece of equipment on the Peter Kiewit canal job. Here it is stopped while driver fills up the Cat diesel engines on the canal trimmer and shaper a few miles west of Shafter, Calif.

and his Texaco service whether working inside or out of the distributor's territory, listen to the Peter Kiewit Sons. Co. statement of this historic irrigation canal job: "For the fourth time in as many years, Peter Kiewit Sons' Company has been working on successive contracts on one of our nation's great irrigation projects. We refer to the Central Valley Project of the Bureau of Reclamation in California. One of the main parts of this ambitious irrigation project will be the 57 million dollar Friant-Kern Canal. It will carry water impounded behind the Friant Dam, northeast of Fresno, California, to the Kern River near Bakersfield, a distance of about 160 miles. PKC Co. was successful in bidding for the first 5 miles of the canal in July, 1945. The following March we repeated for 2 additional contracts totaling another 24 miles. In December '48 we were low bidder on 27 more miles of the canal, the longest section let to date. This current contract is the final one for the present size canal. The project office which has been located at Fresno was moved to the town of Porterville as our work progressed southward. The Great Central Valley of California is about 500 miles long and 40 to 50 miles wide. The elevation varies from sea level to 400 feet. The Sacramento River flowing through the northern half of the valley periodically goes over its banks in the winter and early spring in costly floods. The San Joaquin River, which drains the southern section of the valley, comes down out of the Sierra Nevada Mountains near the city of Fresno. This



Ditch-Digging Diesels! Note the four Cat diesel engines mounted on top for propelling, elevating, trimming and tamping the sandy canal banks and floor as it is excavated. Peter Kiewit Sons Co. 27-mile stretch of Friant-Kern irrigation canal as it nears the Bakersfield end of the job.

Max Crumal's Texaco truck does a daily refueling of every big diesel piece on the Peter Kiewit Sons Co. jobs. Max delivers a service with his truck that has the contractor demanding his service—or else they don't care whose oil products they get. So Max has delivered Texaco diesel, gasoline, Marfak, Havoline, etc. Here is his truck at the big Monighan dragline powered by a Fairbanks-Morse diesel engine.

Max Crumal caught out on a visit to a farmer customer. There's a whiteface bull at the other end of that leather strap in his hand, as Max knows his Herefords as well as his Texaco line.

Max Crumal's Texaco truck delivering Texaco products at ranch near Porterville where 2 Allis Chalmers crawler tractors (G.M. diesels), 2 cotton pickers, trucks, etc., get his Texaco service and products.

southern section of the valley is arid with about two-thirds of the farm land but one-third of the water. Years ago irrigation of the land was started by diverting the water of the creeks and streams and finally by pumping water from the reserves stored by nature in the deep sands underground. Through the years, the ground water level became so depressed that more than 50,000 acres of rich, prosperous land reverted to desert. A much greater land area was also threatened.

"The Bureau of Reclamation project to remedy these two evils is being accomplished as follows: (1) the giant Shasta Dam in Northern California will control the supply of water going into the Sacramento River, holding back the supply in flood season and releasing the water during the dry season so as to maintain a steady flow in the river's lower channel. (The dam also makes possible the production of hydro-electric power.) (2) The Delta Cross Channel (below the City of Sacramento) will divert surplus water from the lower Sacramento River to the pumping plants of the Contra Costa and the Delta-Mendota canals. Through the use of the Delta-Mendota Canal, a supply of water will be sent up the San Joaquin Valley to serve lands which are now irrigated by the San Joaquin River. (3) This exchange makes it possible to use some of the water of the San Joaquin River (stored behind the Friant Dam) for diverting into the Friant-Kern Canal which runs southward from the dam some 160 miles to Bakersfield. Thus the Friant-Kern Canal will furnish a supply of irrigation water to nearly a million acres of land in the southern portion of the San Joaquin Valley. PKS crews under the direction of general superintendent Keith Wasson have successfully met many problems during the construction of the canal. The earlier contracts included more than 2 million cubic yards of granite excavation. Power shovels, cats and scrapers and large walking draglines handled the excavation. Once the canal assumes its rough shape it becomes the job for the 'trimmer' to smooth the ditch to the exact size required to place the concrete lining. The trimming machine which straddles the ditch travels forward on rails running along either side of the canal, shaving the bottom and sides with its endless chain of buckets. Next in line on the parade of big machines is the concrete placer, a slow moving slip-form which places the concrete 3½ in. thick on the bottom and sides of the canal. A pair of dual-drum Koehring pavers supply the concrete. Dry batches are hauled to the pavers from the batching plant by dump trucks. Third in line is the finishing jumbo which permits a number of cement finishers to work at one time. The final machine is the curing jumbo, from which workmen apply the curing compound and place the mastic in the joints. The finished product is a concrete lined canal 85 feet wide at the top, 36 feet wide at the bottom and 17 feet deep. Concrete or wood bridges cross the canal at every street and road intersection. Concrete syphons carry the canal underneath railroad crossings. Countless concrete box culverts carry drainage under the canal.

"Key personnel with general superintendent Keith Wasson include Jim Bett, lining superintendent; Ward White, structure superintendent; Jim Garver, excavation superintendent; Walt Powers, master mechanic; J. W. Lowe, project engineer; Al Ellis, office manager. R. K. Durant, construction engineer, is in charge for the Bureau of Reclamation. Other key Bureau men include S. S. Leonard, assistant construction engineer; J. A. Fraps, division engineer; J. P. Densmore, field engineer."

DIESELS IN A PAPER MILL

Two 1,600 hp. Engines, Installed to Meet Hydro Power Shortages, Prove Their Worth In Permanent Service

By S. E. TOMCZAK*

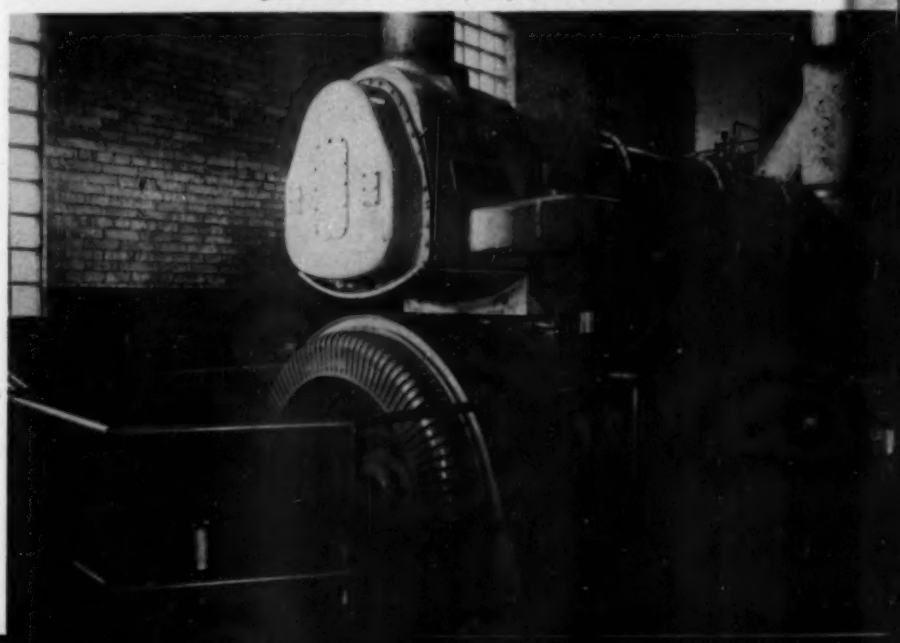
INSTALLED originally to meet a crucial shortage of hydro-electric power, two 1,600 hp. Fairbanks-Morse diesels have earned a permanent place in the power generation system of the Kansas City Star Company's Flambeau Paper Division. As compared with the cost of steam power, the diesels have rolled up savings of more than $50,000 in a single year. The Flambeau paper plant is located on the Flambeau River at Park Falls, Wis., and the principal source of power is the company's three hydro-electric plants with a combined capacity of 4,000 kw. A 1,250 kw. steam turbine provided an additional power supply and any deficiencies were made up by purchases from the Lake Superior District Power Company. This setup had always been adequate until 1947 when the mill was caught in a difficult squeeze. On the one hand, rainfall for the year dropped from the average 36 in. to a scant 26.64 in., forcing a curtailment of hydro-electric generation. On the other hand, a critical shortage of newsprint demanded capacity production of groundwood pulp. The steam plant was over-loaded and purchased power was not available since the utility company also depended on hydro plants in the same region.

The fastest means the company could devise to secure the power necessary to maintain full paper production was a diesel-generator set and officials of the mill and the parent company acted with all possible speed to secure and install a Model 38 D 8 1/8 Fairbanks-Morse diesel, a 10 cylinder opposed piston unit rated at 1,600 hp. at 720 rpm. Put on the line late in August, this engine, driving a 1,000 kw. generator, contributed 1,659,000 kwh. to the power-hungry mill. The following year produced an even greater crisis. It became necessary to replace the old steam boilers and, in the midst of the work, the worst drought in recorded history virtually dried up the storage reservoir. Deprived of normal hydro power, with the utility company equally hard hit ,and with the steam plant down, the diesel was the only dependable power source. But one engine could not possibly carry the load and Flambeau Paper officials decided to install a second identical diesel. Just five weeks later, the engine was in operation. There was no space in the power house for the second unit and no time to extend the brick structure so the diesel was put in a small sheet-metal Quonset hut. This has proven highly satisfactory and may be the answer to many power users who require an economical, easily-erected structure to house their engines.

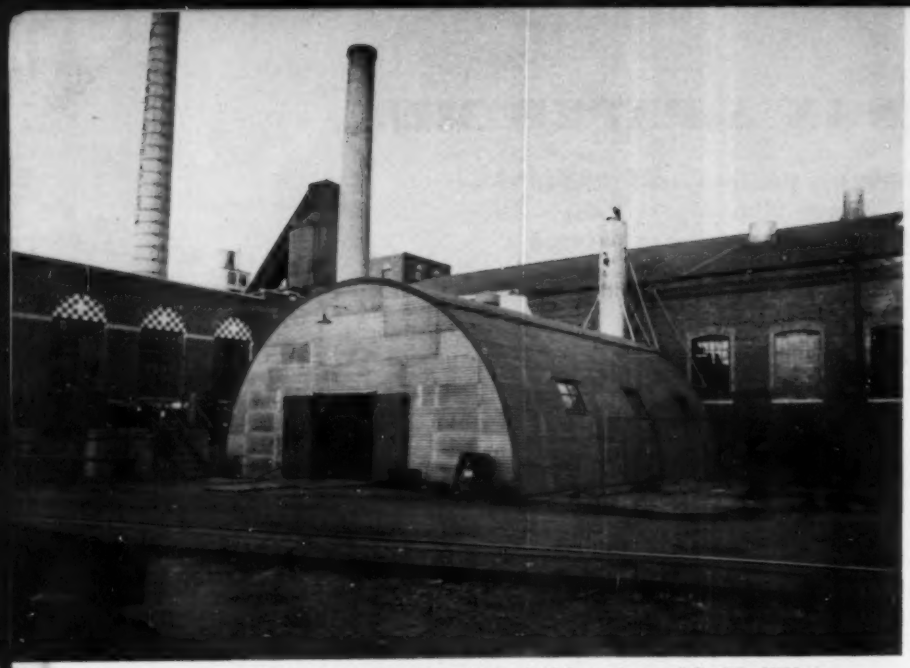
In 1948, the No. 1 diesel produced 6,706,233 kwh. with the No. 2 diesel adding 1,388,149 kwh. for a total of 8,094,382. The next year, diesel production rose to 8,422,349 kwh. In slightly more than three years, from the installation of the first unit in August 1947, to the end of August 1950, the diesels generated 21,023,455 kwh. Table I gives the comparative production figures for those years for diesel, steam and hydro plants. It is evident that hydro is used as much as practicable with diesels handling the bulk of the remaining load. Steam power, today, serves only as an emergency standby. The diesel production figure for 1950 is not truly indicative of the current level of diesel generation since it includes the slack spring and summer months but does not include the heavy fall period. The diesels are started up about Sept. 1st and run at near capacity almost continuously until the spring thaw. A glance at the cost picture explains the preferences in means of generation. In the last full year, 1949, the average cost of producing hydro power, including labor, maintenance, lubricants, supplies, taxes, interest and depreciation, was $.0073 per kwh. Diesel expenses, including fuel and all the other items listed, was $.0129. Steam cost $.0198 per kwh. Thus, in that year, diesel cost $.0069 per kwh. less than steam, a saving of more than $58,000 on the volume of diesel production. Even comparing this diesel cost with the higher and more economical steam production of 1948, the diesel savings amount to more than $45,000. The paper company has a buy and sell arrangement with the utility at a rate of .016 per kwh. Comparing this figure with the 1949 diesel average of $.0129, we get a net advantage for the diesels of $.0031 per kwh. or a total of more than $26,000 on the year's production. Actually this is an academic comparison since purchased power is not available during times of water shortage when it is needed most. At any rate, it is clear that the diesels have earned their place in the plant as dependable and economical power producers.

Fuel, of course, is the principal item of production expense. A long freight haul up into northern Wisconsin brought the 1949 average price for diesel fuel up to 13.16 cents a gallon. This puts a premium on engine efficiency and Flambeau's diesels measured up with a production of 13.3 kwh. per gal. of fuel consumed. Lubricating oil is handled carefully to provide maximum engine protection without waste. The detergent-type lube is by-passed from the engines' pressure lubrication systems through pairs of filters, one a metal screen, the other a cellulose cartridge filter. Oil is subjected periodically to laboratory tests and has been reported consistently in excellent condition. No lube ever has been discarded. The diesel cooling system also makes its contribution to paper production economy. Each engine has a closed soft-water circuit, with an engine-driven centrifugal pump circulating treated water through the engine jackets and a heat exchanger. A second engine-driven centrifugal draws water from the mill's water main just after the filter plant, boosts its pressure from

Since the first 1600-hp. F-M diesel was installed in August 1947 the two units have generated 21,023,455 kwh. Including fuel, labor, maintenance, lubricants, supplies, taxes, interest and depreciation, the cost for powering diesels for the last full year was $.0129. The generator is Electric Machinery Company.



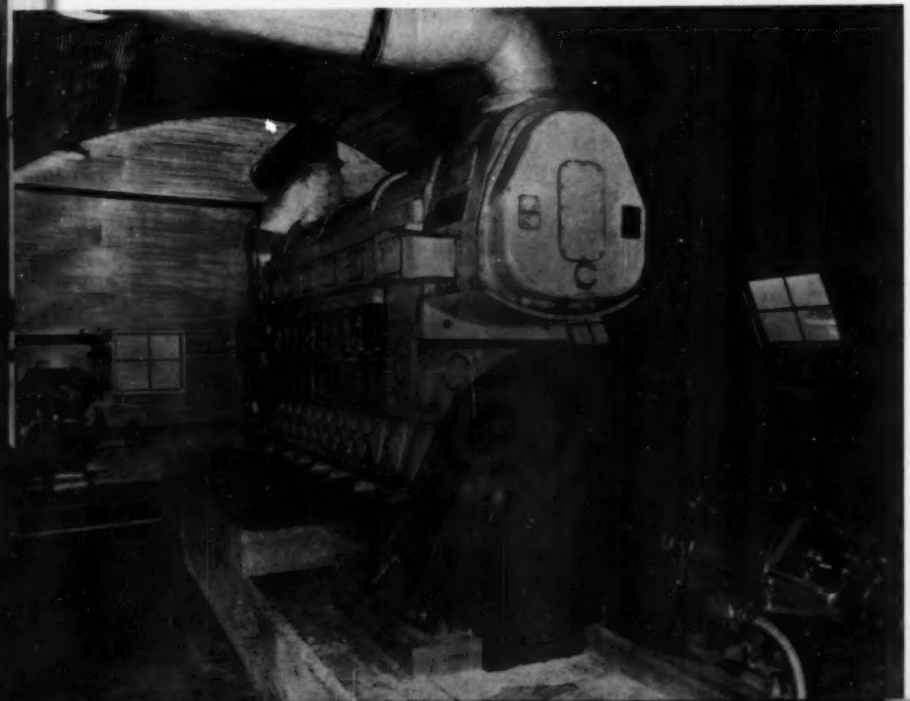
*Plant Engineer Flambeau Paper Division, The Kansas City Star Company, Park Falls, Wisconsin.



Five weeks after the Flambeau Paper Division decided upon its second diesel the 1600-hp. F-M engine was in operation. With no space for a second unit in the power plant and no time to extend the structure, a sheet-metal Quonset hut was thrown up to house this diesel—a quick economical solution to the problem.

A panoramic view of the Flambeau Paper Division plant. The power plant is located near the smokestack at the right.

Auxiliary equipment for the two F-M engines at the Flambeau Paper Division are identical except for the generators. This second 1600-hp. diesel drives a 1000-kw. Crocker-Wheeler 2300-volt generator.



70 psi. to 92 psi., puts it through the exchanger and returns it to the mill water supply line. Since this process water must be heated before it can be used in the mill, the waste heat picked up from the diesel cooling system effects a direct fuel saving. Temperature in the diesel jackets is maintained at the desired level by means of an automatic thermostatic control valve which by-passes water around the exchanger as necessary.

Engine air for these two-cycle diesels is drawn viscous-impingement type filters outside the buildings and delivered to the suction of the scavenging air blowers which supply 6,800 cfm. at 3 psi. to each engine. Exhaust gases vent through vertical silencers. Plant engineers now have under study a means of utilizing some of the heat wasted by the diesel exhaust. Drying the paper at this mill requires 175,000 cfm. of air. In winter, the rush of cold air into the plant makes for difficult operating conditions. It would be helpful if the exhaust silencers were jacketed and air for the plant drawn through these jackets. To keep the diesels at peak efficiency, the plant has a careful preventive maintenance program. About every two weeks, the engines are shut down for two hours for inspection and servicing. At that time, ports and the air intake header are cleaned. About every 8,000 to 12,000 hours, pistons are pulled and there is a complete inspection of bearings, liners, pistons, piston rings, wrist pins, bushings, timing chains and any other parts that may need servicing or adjustment.

Table I: Kilowatt-hours generated since installation of first diesel in August 1947.

	Diesel	*Steam*	*Hydro*	*Total System*
Aug-Dec.				
1947	1,659,000	2,751,400	7,545,500	11,955,900
1948	8,094,382	7,255,900	11,315,000	26,665,382
1949	8,422,349	3,477,200	16,155,000	28,054,549
Jan-Aug.				
1950	2,847,724	28,100	15,234,500	18,110,324
Totals	21,023,455	13,512,600	50,250,100	84,786,155

List of Equipment

Engines—Two 1,600 hp. Model 38D8-1/8 two-cycle opposed-piston 10 cylinder, 720 rpm. diesels. Fairbanks, Morse & Co.

Generators—Two 1,000-kw., 3 phase, 60-cycle generators:

(1) Electric Machinery, 480 volt, 3 phase, 60-cycle;

(2) Crocker-Wheeler, 2300 volt, 3 phase, 60-cycle.

Governors—Woodward Governor Co.

Fuel Oil—Standard Oil Company of Indiana.

Fuel Filters—Commercial.

Lube Oil—Standard HD Standard Oil of Indiana.

Lube Filters—Purolator Products, Inc.

Auxiliary Lube Pumps—Blackmer Pump Co.

Exhaust Silencers—The Maxim Silencer Co.

Air Compressor—Worthington.

Heat Exchangers—Harrison.

Thermostatic Control—Fulton Sylphon Co.

Pyrometer—Brown Instrument Co.

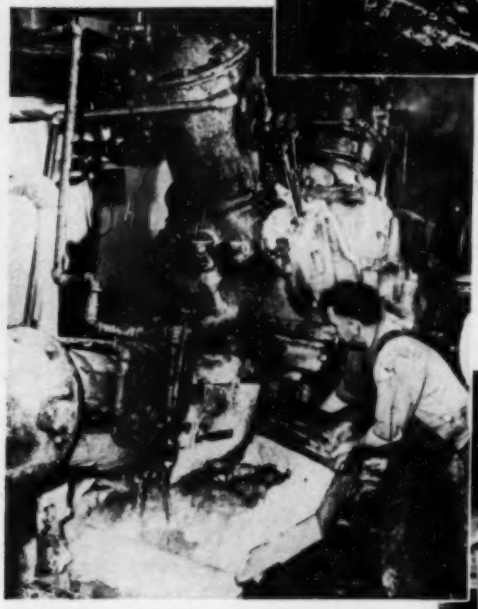
Switchboard—Roller-Smith Co.

Voltage Regulator—Burlington Instrument Co.

Cooling Water Pumps—Fairbanks, Morse & Co.

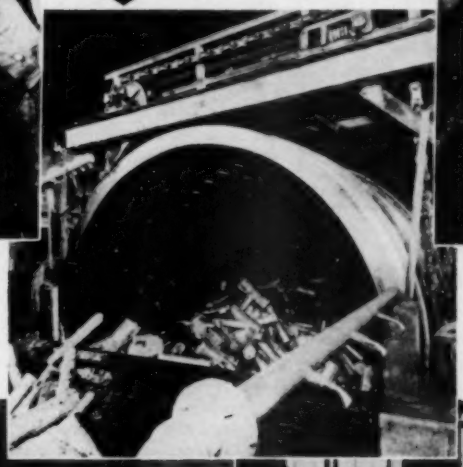
The first step in transforming logs into paper. These slasher saws cut the logs into 4-ft. lengths.

This wood grinder, one of six in the plant, reduces the logs to groundwood pulp. Each grinder has four pockets, one of which is being loaded with a log in this picture. These pockets are really hydraulic rams which force the logs against an abrasive wheel until reduced to pulp. Three of the grinders in this plant are water driven; three electric driven turned by 500-hp. motors.



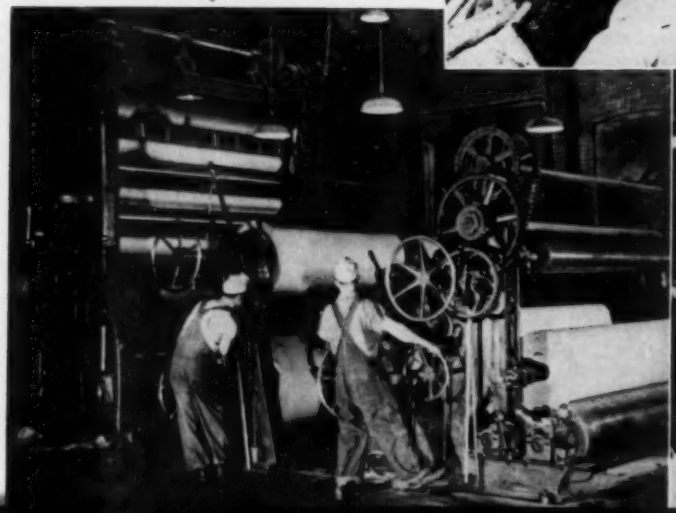
In making sulphite pulp the logs are put through a chipper and cut into ⅝-in. chips. Here these chips are being poured into a digester where they are cooked in sulphite acid to dissolve the lignin that binds the fibers in natural wood. After washing and screening the mixture is pumped from the digester to the dewatering machine which reduces the amount of water.

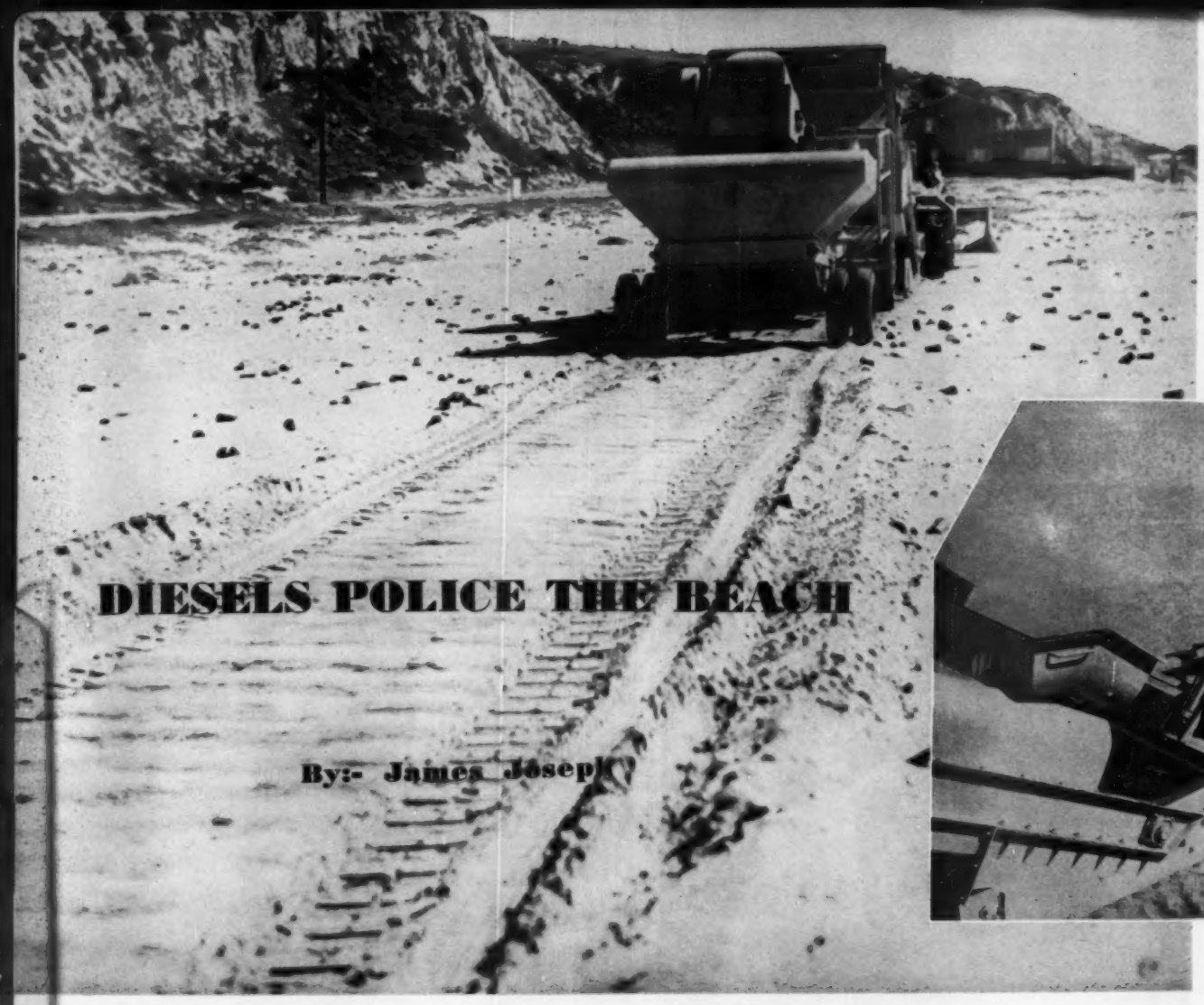
After being cut to 4-ft. lengths the logs are conveyed to this huge drum which tumbles them until the bark is rubbed off and washes them. This is the discharge end of the drum.



After compounding fibers are brushed out on a Jordan machine. Then the stock goes to the Fourdrinier paper machine shown in the foreground of this picture. The stock flows out on the continuous finely-meshed Fourdrinier wire where the web is formed. The sheet is then carried through rolls which squeeze out much of the water and on through the dryer section background) where most of the remaining water is evaporated.

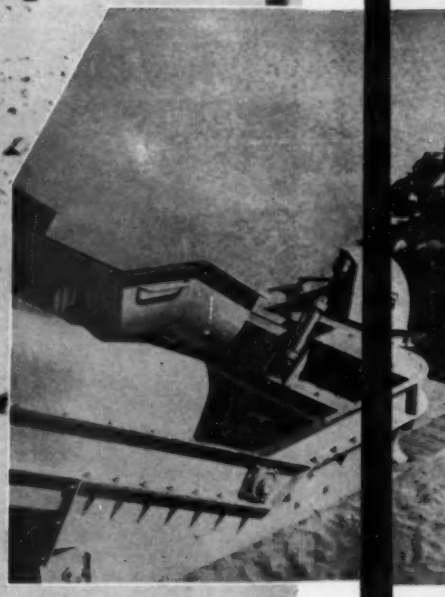
After the sulphite mixture is bleached it is poured into paddle-agitated mixing vats called beaters. The master technician here compounds the proper pulp with dye, size and filler to obtain the characteristics required for each end product.





DIESELS POLICE THE BEACH

By:- James Joseph



BEHIND the International TD-14, a yellow monster of a machine was gulping in big mouthfuls of beach sand, tin cans, old broken glass and sea-hardened campfire cinders. Deliberately, like a thing alive, the machine digested its gritty, unpalatable meal, and with mechanical disgust heaved the debris onto a conveyor leading to a 4 cu. yd. dump trailer. The clean sand it spit back upon the beach. All this mechanized gastronomy had but one goal—to sift through refuse-infested beaches, and to leave them clean as an uninhabited atoll. And diesels, lugging the 18-ton beach cleaner, were making it possible for careless mortals to all but ruin their beaches one season and return the next to find them clean again, and ready for more abuse from beach-goers. The beach cleaner, one of five now working from California to Rio, is called the Sanitizer. Depending on the depth of cut and on the moisture of the sand, the Sanitizer can gulp down and spit out some 2400 sq. yds. of beach every hour—and can do it because it is pulled by diesel tractor.

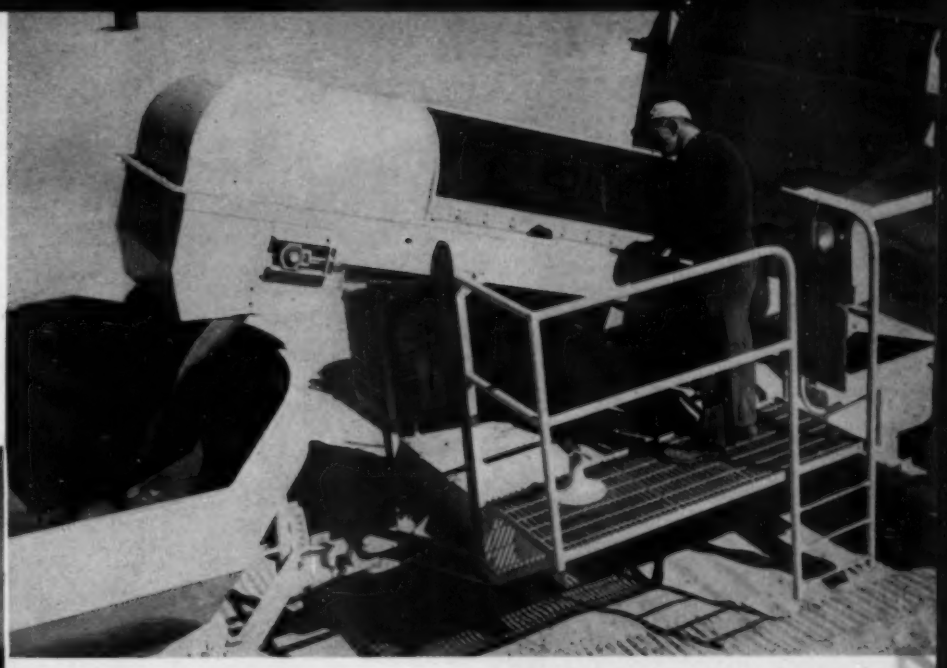
Currently, there are three Sanitizers on the West coast. At least one of these is in almost constant operation by the Los Angeles County Recreation Department which recently received delivery on the $30,000 beach-cleaner. Two more units are scheduled for shipment to South America to clean Rio's beaches and another will be shipped shortly to Australia for beaches there. All will prove a kind of challenge to diesel tractors. In the first place, very few pieces of diesel equipment are required to take up permanent abode in abrasive beach sand. The track-running International TD-14 used by Los Angeles county has already been harassed by sand and salt air, yet after a year's operation with the cleaner (it pulled a pilot model for over a year before the county got delivery on a machine of its own), it has stood up well. Still, track idle rollers have had to be replaced and the air filter has been cleaned every day—sometimes more often than that. The abrasive action of beach sand is constant and severe. Very dry sand, especially, keeps working on parts—especially moving components. Another spot on the diesel tractor which has been attacked by sand is the track chain belt and its pins. Sand worked into these parts, loosened them, and made the chain "sloppy" and loose. Bottom rollers, which spend their life time in sand, get the worse going over.

The TD-14, with a 12-ft. blade, has two jobs on the beach, it pulls the beach cleaner, and it dozers a hole in which to bury non-combustible refuse picked up. The beach-cleaning machine, invented by Vic Chatten, Torrance, Calif., is self-contained. Here's how it works—38 buckets, each 5 foot long, and divided into three sections, ride on an endless link belt. The belt travels at 120 fpm. geared to an International, Overhead valve, gas-fired engine, set athwart the machine. Each bucket has a mesh-screen insert, with mesh easily removable. Mesh is either 5/16 or ½ inch square. The diesel tractor operator, working a push-button, remote control panel from the dozer's seat, triggers an hydraulic 2-way piston which lets the front of the cleaner down into the sand. This allows the buckets to dig in as deep as 10 inches. Rake teeth and small plow-light components feed sand back to the buckets. The moving buckets pick sand up and as the buckets move upward, they begin to vibrate.

(After clean-up) Sanitizer, diesel-towed, leaves behind a 6½-foot clean strip.

A second beach maintenance man stands on platform beside debris belt, picking out valuables as they are carried out of machine on an endless belt. Other debris is carried into 4-cu. yd. hopper-car pulled behind unit. All of it dieselized. International gas-fueled engine seen in this photo controls buckets and endless belts.

Towed by diesel, the front end of the Sanitizer digs in, cleaning sand to a depth of 10 inches.



International TD-14 heads into debris-strewn beach. (Before clean-up)

Idle rollers take a beating in the abrasive sand. Driver inspects the TD-14.

This shakes the clean sand through the mesh and it falls back into the same cut which is held open just long enough to receive the clean sand. Debris —tin cans, glass, etc.— remains in the buckets and is finally dumped by a half-turn of the bucket onto another endless belt. This belt, called the sorting conveyor, is 2½ feet wide and of rubber. Debris is carried by this belt and flows into a hopper-type, gondola-bottomed 4 cu. yd. trailer pulled behind the machine. After the trailer is full, it is either uncoupled and hauled by truck to a nearby dump site, or the dozer lowers its 12 foot blade and opens a hole to bury the debris. The gondola bottom allows for quick dumping.

While the Sanitizer has no motive power of its own, it does have its own gasoline engine to run the belts, buckets and hydraulically-operated jack which lowers and raises the front of the machine into the sand to the proper depth. Mounted on the rig is an International 4-cylinder, overhead valve, gas-fueled engine, which is coupled through a Foote-Bros. Hy-Power enclosed worm gear drive to the various conveyors. There is also a 750 watt Kohler light plant which can supply electricity for night time operations and also triggers the solenoids which start the International engine. The Kohler is responsible for making the unit a one-man operation if desired. That's because of the push-button controls. On the other hand, a beach maintenance man usually rides the rig, and stands near the debris belt picking up lost articles. These, perhaps watches, teeth, and sometimes money, are returned to their owners if claimed.

The TD-14 pulls the cleaner at a rate of from 1¼ to 1½ mph. and the Sanitizer cleans a 6½-foot swath—or 2400 sq. yds. per hour. The Sanitizer does such a good job that a beach need be cleaned only about twice a year. The public, no matter how careless, can't dirty a beach up as fast as the rig can clean up after them.

The State of California, which got delivery on the third cleaner working in the U. S. bought a Caterpillar D-6 just to pull the Sanitizer. This rig will operate on Huntington State Park Beach, near Long Beach, Calif., with the job of cleaning 300,000 sq. yds. of sand. Incidentally, the pilot Sanitizer, built at a cost of $50,000 three years ago, and likewise pulled by diesel tractor, has by now cleaned 1,000,000 sq. yds. of beaches.

One reason for the Sanitizer's ruggedness is that parts which are constantly abrazed by sand are made from manganese—an exceedingly hard metal. Los Angeles County's cleaner will move between

Sanitizer on a debris-strewn beach.

Diesel operator, using this remote control switch box, can drive and at the same time control all action of the Sanitizer, making it a one-man operation if necessary.

five southern California beaches. Longest cleaning job will be Redondo's 2-mile long sand-strip. Flat-deck trucks transport the machine from beach to beach. However, it is now agreed that the machine will remain at each station about a week, allowing twice-a-year cleaning at each beach and frequent special assignments. Diesel and gas-engine maintenance is simplified and job-site stuff. Maintenance consists mainly of changing air filters daily, checking for excessive sand abrasion, and watching lubrication carefully. The cleaning unit runs on Seal-Master bearings, which are immune to sand. This machine is said to be the first really successful beach-cleaning device now in operation—and diesel tractors give it motive power.

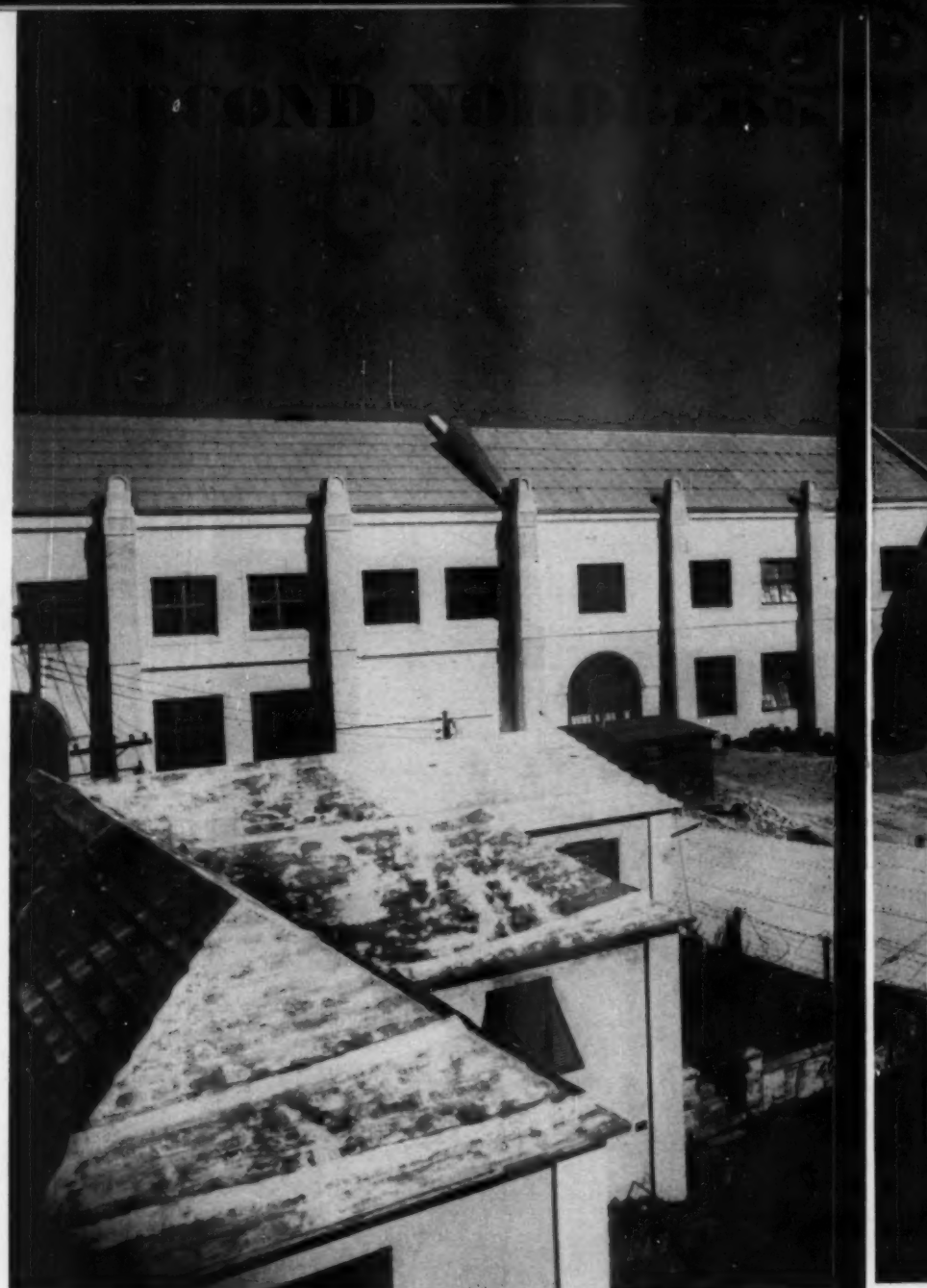
NOW rounding out forty-three years of growth and expansion, the Bermuda Electric Light Co., Ltd., has established a consistent record of successful and profitable operation. This record is clearly seen as the dual result of sound management and its recognition of the efficiency and special applicability of diesel engines. More will be told of the management further on. But as we survey this larger than average power plant and its remarkable record of performance we ask why diesel engines became the accepted and universally used prime movers at less than midway in its history. And thereby hangs a tale. Back in 1908 the then Bermuda Electric Light, Power and Traction Co., Ltd. started business, primarily to protect its franchise, down on the water front in Hamilton with the installation of an Otto gas producer and a 70-bph. Nash gas engine belted to a 50-kw. Crocker-Wheeler generator – probably called a dynamo in those days. Today the plant has nine operable diesel units with a total generating capacity of 15,000 kw. The most recent of these units is the Nordberg, ten-cylinder, 4,250-bph. diesel and 5,000-kw. Westinghouse generator which went on the line in August, 1950. A tenth unit now being erected will bring the plant's rated capacity up to 17,000 kw. So much for the advances made in less than half a century.

Several gas producer sets had been added to the plant as its services were extended during the first fifteen years. But at the close of that period it was discovered that gas producers were not available in larger capacities indicated for logical expansion of generating facilities. This posed the problem of what other types of prime movers would be best suited to the future needs of this fast growing utility. Naturally steam was considered, but since the supply of fresh, soft water in Bermuda is limited to the collection of rainfall, it did not seem feasible to pursue the steam idea further. These considerations were going on in 1920 and early 1921.

Perhaps by the merest coincidence but more probably because of his avid thirst for information, the late Mr. H. G. W. Spurling, then superintendent engineer, just at this time read a trade paper article describing a diesel generating unit of the exact capacity he had in mind. This lead to the installation of a 300-kw. Vickers Petters diesel in 1921. The experience gained in operating this unit clearly demonstrated the advantage of diesel over steam in over-all efficiency, and launched the company on a diesel expansion program from which it has not deviated.

The Petters engine has since passed into discard as has a Campbell 300-kw. diesel which was installed in 1923. So that today the oldest operable engine in the plant is a 6-cylinder, 1,175-bph., 240-rpm. Willans-Fullagar, two-cycle, opposed piston diesel, directly driving an English-Electric 750-kw. alternator. This engine was installed in January, 1925, and it was originally equipped for air injection, or "blast," as they say here, later converted to solid injection using C.A.V. fuel pumps.

The subsequent chronology of expansion and the equipment installed from 1925 to 1950 is given in Table I. The table shows how rapidly the plant has grown and how the increments of generating capacity have increased.



The very backbone of the load here in Bermuda is domestic. The plant has never had a major industrial or commercial load, but the management hopes that the discontinuance of the English Navy Dockyard here will attract some industries to that site. In view of these conditions, it is, however, interesting to note the favorable power factor they have achieved. For example, during the year just passed the maximum power factor ranged from .88 to .97; the minimum from .60 to .69; and the average from .791 to .828. This is achieved without benefit of condensers, capacitors, synchronous motor equipment. In other words there is no power factor corrective equipment in use in the system.

The foregoing is confirmed by the system load factor which is shown month by month for 1950 in Table II. We understand that the aggressive merchandising of electric appliances has contributed in no small way to this favorable distribution of the load; particularly during the night. Referring again to Table I it is seen that although

eight of the ten generating units are of English make, the Nordberg Manufacturing Company broke the ice (which never occurs physically or in human contacts in this delightful, semi-tropical English colony) in 1939. This first Nordberg, eight-cylinder, two-cycle, 3,180-hp. diesel to be installed in the Bermuda Electric Light plant was fully described by our editor Rex. W. Wadman in the February 1940 issue of DIESEL PROGRESS. That was eleven years and two months ago, so to review briefly, this engine is 21-in. bore, 31-in. stroke, crosshead type with mechanical injection. It is the engine that Nordberg has built in various versions from six to twelve cylinders for both marine and stationary application.

In spite of their natural and economic leaning toward English-made equipment the people in this plant are most enthusiastic in their praise of the Nordberg engine, the sincerity of which was demonstrated when they purchased another in 1948. This is a ten-cylinder engine of the same general design as the first engine with some variations in its accessory equipments and a half inch larger bore. It is the largest unit in the plant, rated as it is at 4,250 bhp. turning at 225 rpm. and direct connected to a Westinghouse alternator delivering 3,000 kw. net to the switchboard. An additional 300-kw. is drawn from the generator to drive the Roots-Connersville scavenging blower.

The plant management allowed Nordberg engineers free latitude in the selection of accessories for this unit and it is therefore not surprising to see that these equipments are of American make. Engine speed is regulated by a Woodward Isochronous governor which controls the effective stroke of the American Bosch fuel injection pumps. Manzel force feed lubricators monitor the lubrication of cylinders and crossheads using Texas Ursa medium heavy oil. Twenty Electric Auto-Lite thermometers are mounted on the engine itself – ten to show the temperature of main bearings and piston cooling oil and ten to show temperature of jacket cooling water at each cylinder head outlet. A ten-point Alnor pyrometer monitors the individual cylinder exhaust temperatures and a Reliance tachometer shows engine rpm's. at all times.

Pressure lubrication to crankshaft main and rod journals, camshaft bearings, crossheads, in fact to all rotating parts also for piston cooling is effected by two DeLaval Imo pumps, one of which is a spare, installed in the basement. The oil used in this system is Texas Algol. The other Nordberg engine and all of the English-Electric units have their own lubricating oil circulating pumps built into the engine sumps. All of the Fullagar engines are lubricated by Germ Lubricants, Ltd. Argon XH. Continuous purification of the lube oil is accomplished with a Honan-Crane unit using "Cranite" as the filtering medium. But when we come to the lube and jacket water cooling systems we again realize how great the fresh water problem is in Bermuda.

As pointed out above the only supply of fresh, soft water is through collection of rainfall. That is why the immaculately white roofs that sparkle on sunbathed hillsides wherever you look, didn't just happen. For the most part these roofs are of masonry construction coated with lime and every drop of rain falling on them is collected in cisterns supk in the ground. On the other hand there is plenty of underground water to be had by sinking wells, but due to seepage of water through the porous coral rock that underlies and is Bermuda, all well water is brackish. So the closed jacket cooling system uses fresh water which is circulated through two Struthers-Wells exchangers by Allis-Chalmers pumps which are driven by Westinghouse motors. Another pair of Struthers-Wells heat exchangers handle cooling of the lube oil by using the same fresh water that circulates in the engine jacket system. Two DeLaval Imo pumps, driven by Westinghouse 25-hp. motors, circulate the lube oil.

The two water coolers for the new Nordberg engine are installed outside and to the rear of the plant, wheras all other coolers are inside. The plan is eventually to have all of the coolers outside in order to facilitate cleaning which must be done quite frequently because of rather heavy deposits from the brackish water.

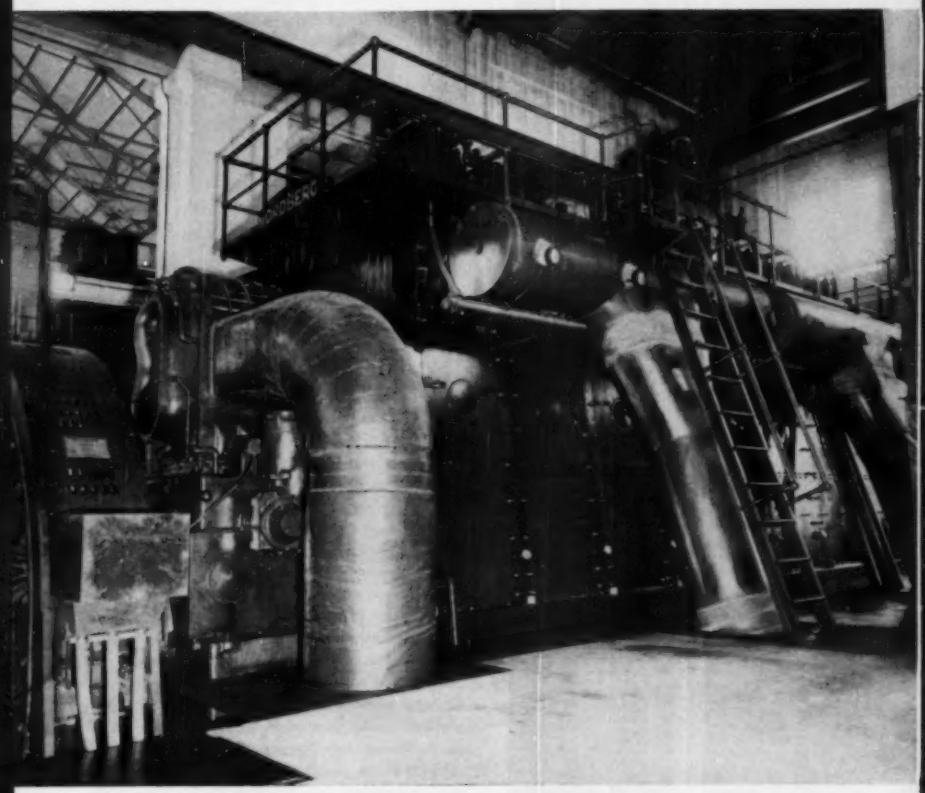
Like practically all of Bermuda, Pembroke Parish is residential and this plant is situated in the

TABLE I

Date Installed	Make of Engine*	No. of Cylinders	Bore	Stroke	Make of Generator	**Rating of Unit	RPM.	Injection	Pumps
Jan. 1925	English Electric Fullagar	6	14	16	English Electric	750 kw.	240	Solid	C.A.V.
Dec. 1926	English Electric Fullagar	6	14	16	English Electric	750 kw.	240	Air(blast)	——
Jan. 1930	English Electric Fullagar	8	14	16	English Electric	1000 kw.	240	Air(blast)	——
Dec. 1931	English Electric Fullagar	6	19	22	English Electric	1500 kw.	200	Solid	C.A.V.
July 1937	English Electric Fullagar	8	19	22	English Electric	2000 kw.	200	Solid	C.A.V.
Nov. 1939	Nordberg	8	21	31	Westinghouse	2000 kw.	225	Solid	Am-Bosch
Apr. 1941	English Electric Fullagar	8	19	22	English Electric	2000 kw.	200	Solid	C.A.V.
Mar. 1949	English Electric Fullagar	8	19	22	English Electric	2000 kw.	200	Solid	C.A.V.
Aug. 1950	Nordberg	10	21½	31	Westinghouse	3000 kw.	225	Solid	Am-Bosch
Now being erected.	English Electric Fullagar	8	19	22	English Electric	2000 kw.	200	Solid	C.A.V.

*All engines in this plant are two stroke cycle.

**The total of these ratings is 17,000 kw. but on completion of the last unit, the Fullagar, Six-cylinder, 750 kw., air injection unit will probably be discarded to make room for further plant extensions. Meantime, the net total generating capacity of the plant will be 17,500 kw.



Exhaust side of the new Nordberg, 8-cylinder diesel showing Westinghouse 2,000-kw. alternator, Roots-Connersville scavenging blower, electric barring unit and Electric Auto-Lite thermometers on exhaust and crankcase.

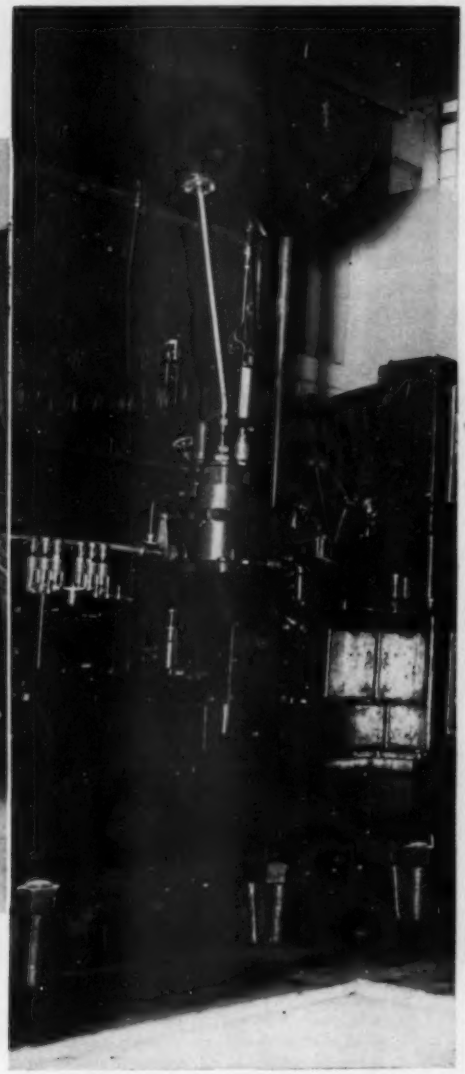
heart of this community. In fact it is only a scant mile from the heart of densely populated Hamilton. Consequently there can be no objectionable noise. This problem evidently has been solved most effectively since the noise level is exceptionally low. Exhaust from the big new Nordberg engine through the Maxim silencer is heard as a deep throated whisper and intake frequency is so well subdued by a Maxim silencer that it is lost in the low rumble of the plant in general. The engine air supply is passed through American Air Filters of the automatic self-cleaning type.

TABLE II

Monthly Load Factors and Average Load Factor for 1950

January	53.77%
February	54.63%
March	57.94%
April	56.47%
May	61.25%
June	61.82%
July	66.06%
August	65.76%
September	64.21%
October	59.24%
November	56.57%
December	55.76%
Average	59.48%

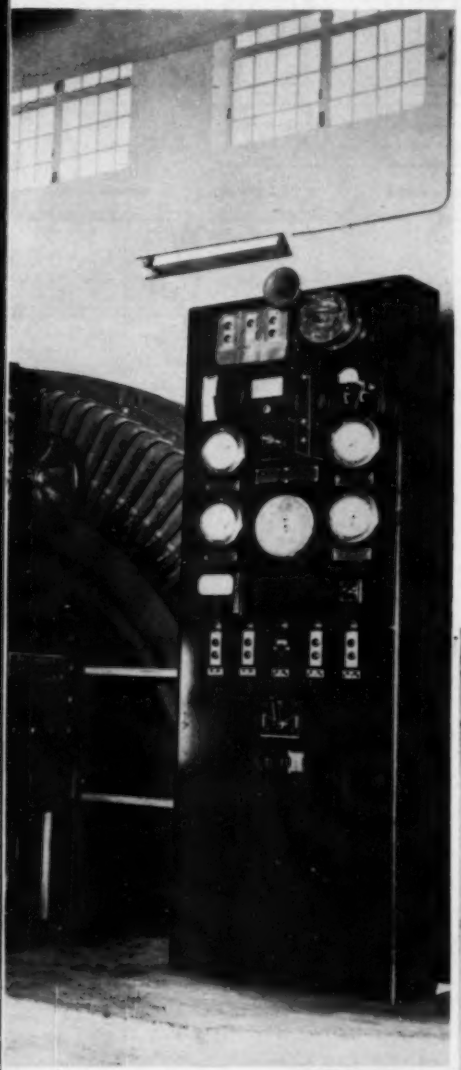
As the plant has grown the fuel system has been expanded and rearranged to meet changing conditions. Today the main fuel storage facilities consist of one 2,000-ton and three 500-ton tanks at the power-house site on Serpentine Road, Pembroke, while South American tankers unload regularly at the docks in Hamilton. From these docks the fuel is pumped over the hill through an underground pipe line to a battery of two DeLaval (English) and one Sharples centrifuges from which it is transferred to two 100-ton service tanks and thence to two 8-ton day tanks. From the day tanks the fuel flows by gravity to service tanks on

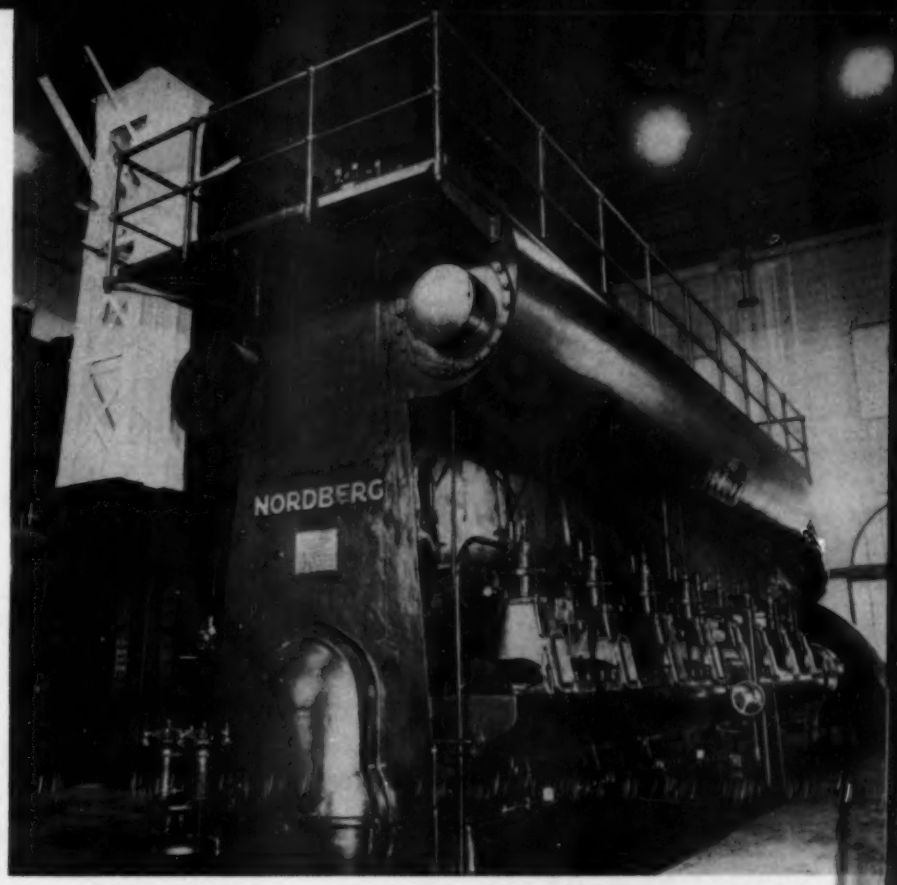


Closeup of the control station on the Nordberg 4,250-hp. diesel, showing Woodward governor, one each of the ten American-Bosch fuel injection pumps and Manzel lubricators, also an Alnor pyrometer. Just above the fuel pump is seen a Meriam manometer which registers the scavenging air pressure.

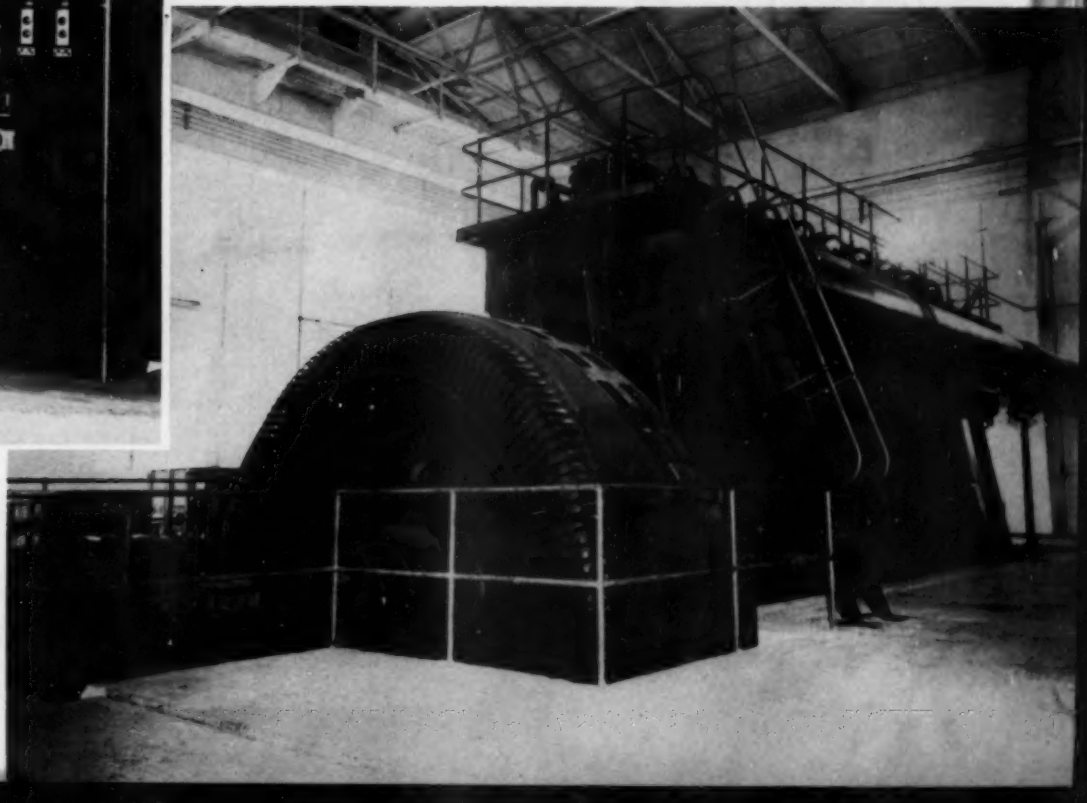
each engine. On both of these Nordberg engines the fuel is then passed through Nugent Duplex filters and thence to the bus rail that feeds the injection pumps.

It is a big plant and it is still growing. Some of the problems peculiar to its development and operation have been treated here but a volume would scarcely cover all of the conditions which the far-sighted and capable management have faced down through the years. To the original Superintendent Engineer, the late Mr. H. G. W. Spurling, goes much credit for the sound engineering which





Injection side of the 8-cylinder, 3,180 hp. Nordberg diesel installed in the Bermuda plant in 1939. It is equipped with American Bosch fuel injection pumps, Manzel lubricators and Nugent duplex fuel filters as seen in this view. A detailed description of this engine and its installation appeared in the February 1940 issue of DIESEL PROGRESS.

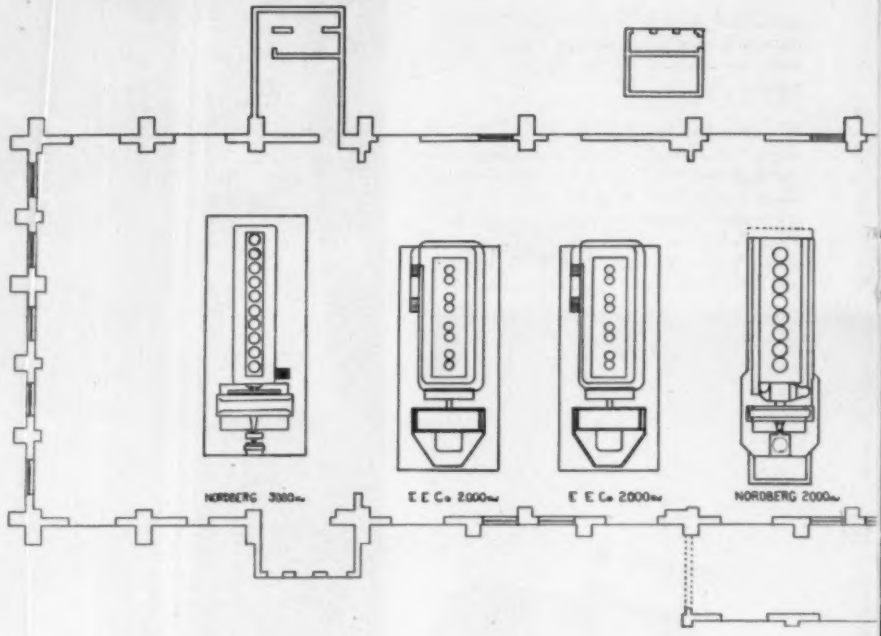


Generator end of the new Nordberg unit. The 3,000-kw. generator and its exciter are Westinghouse. The use of Electric Auto-Lite thermometers is well illustrated on the bearing, lube and piston cooling oil.

pulled this plant through its early growing pains for the thorough training which prepared his successors to carry on as they are doing today. These are Mr. Basil S. Seymour, superintendent-engineer and his first assistant, Mr. S. W. Roberts; also Mr. W. E. Spurling, who was recently appointed general manager and secretary, after thirty-nine years' service of which thirty-three years were spent as assistant manager.

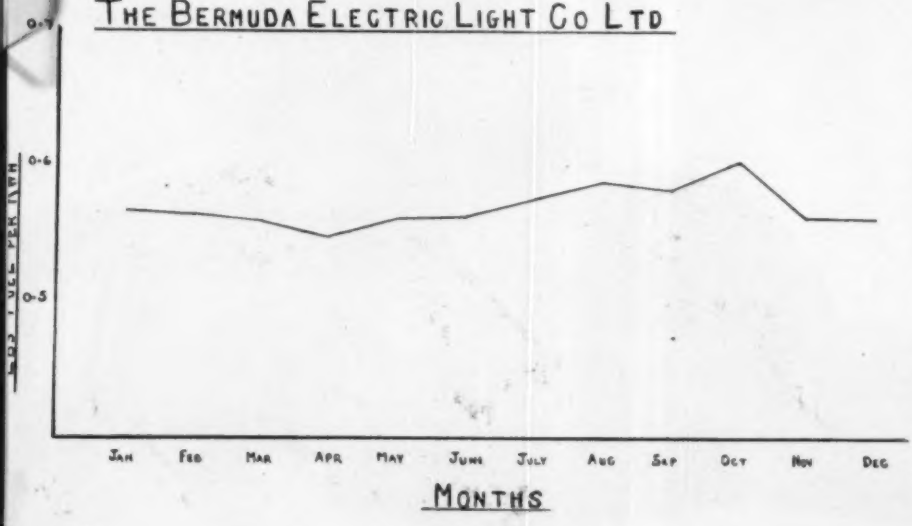
These men are no floaters—they have lived with their jobs day and night with the vision and perseverance that characterizes men carrying out what they consider a life's work. For example, Mr. Seymour came to Bermuda in 1924 for the English-Electric Co., Ltd., to erect the first Fullagar unit —intending to complete the job in six months or so and return to England and his family. He is still here and if title, responsibility and personal attitude are criteria, it appears that he is here to stay. Mr. S. W. Roberts might be named dean of the plant, having been on the spot when the first little 50-kw. gas engine and gas producer were installed in 1908. That gives him some forty-three years of service—faithful service. To our American readers it will be of interest to observe that Mr. W. E. Spurling received his education in Electrical Engineering at the Lewis Institute of Technology in Chicago, and also was employed by the Western Electric Company in the same city. He has been a member of the American Institute of Electrical Engineers since 1939.

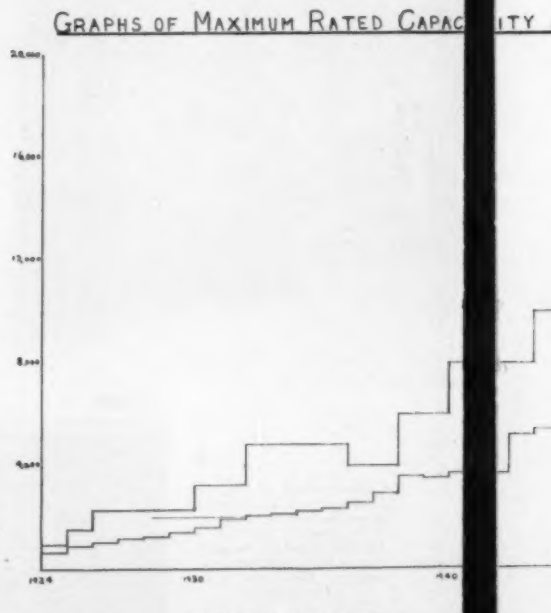
Under the painstaking guidance of these men who know every nut and bolt and eddy current in the plant, so to speak, from first hand experience, the operation goes on smoothly while it is constantly expanding. For example, when Rex. W. Wadman came down here in 1940 to write up the first Nordberg engine, the annual production of the plant was 14,216,054 kwh. By contrast the records for 1950 show a total production of 38,443,242 kwh. A mighty healthy growth especially when it is considered that the average over-all station thermal efficiency has been maintained at better than 30%.

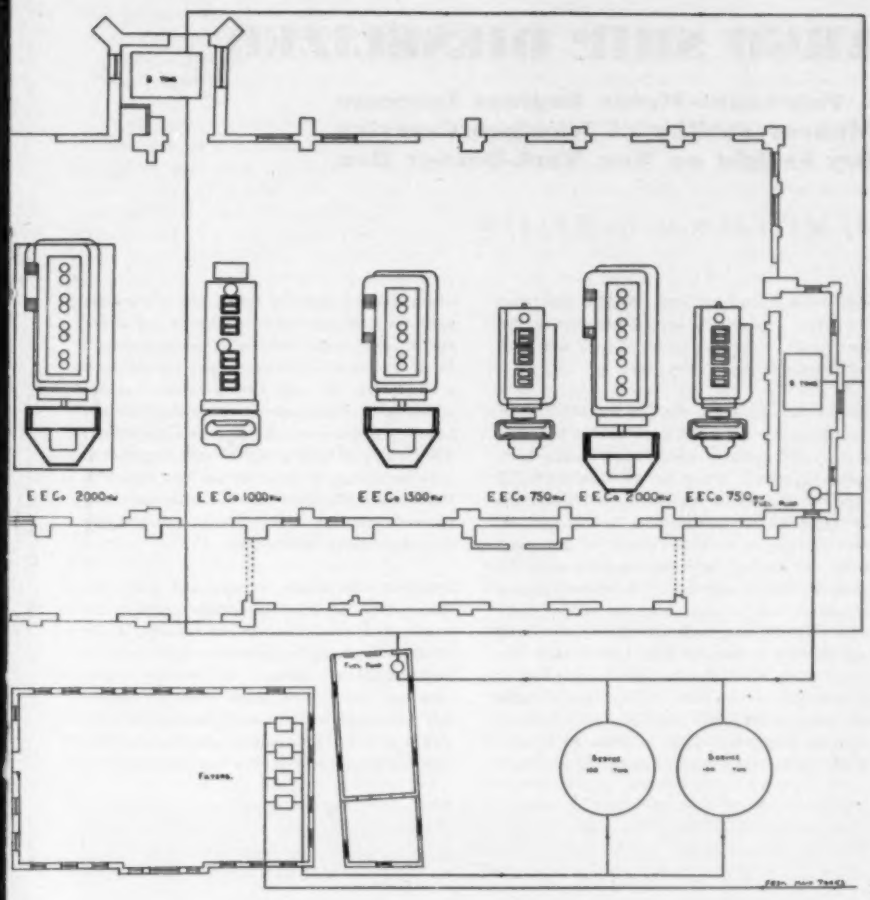


DIAGRAMATIC LAYOUT OF
BERMUDA ELECTRIC LIGHT CO PLANT
SERPENTINE RD PEMBROKE
BERMUDA

Fuel consumption record for 1950. Note the sharp rise for month of October was caused by running the new unit on extensive tests during which it was not connected with the switchboard and therefore was not producing current contributing to this record.



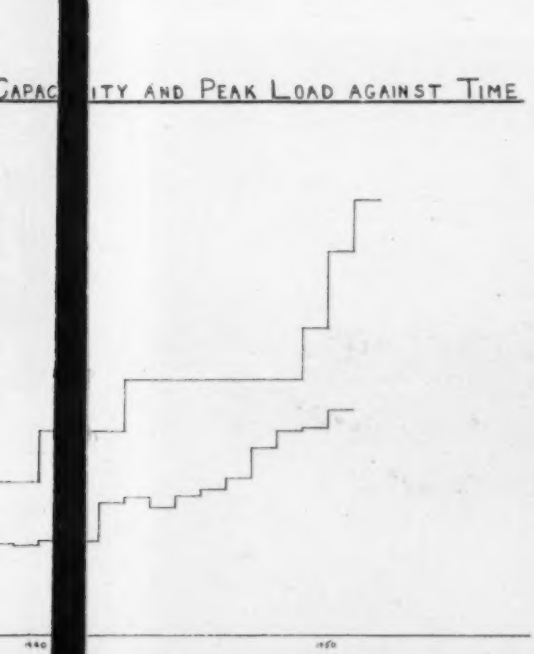


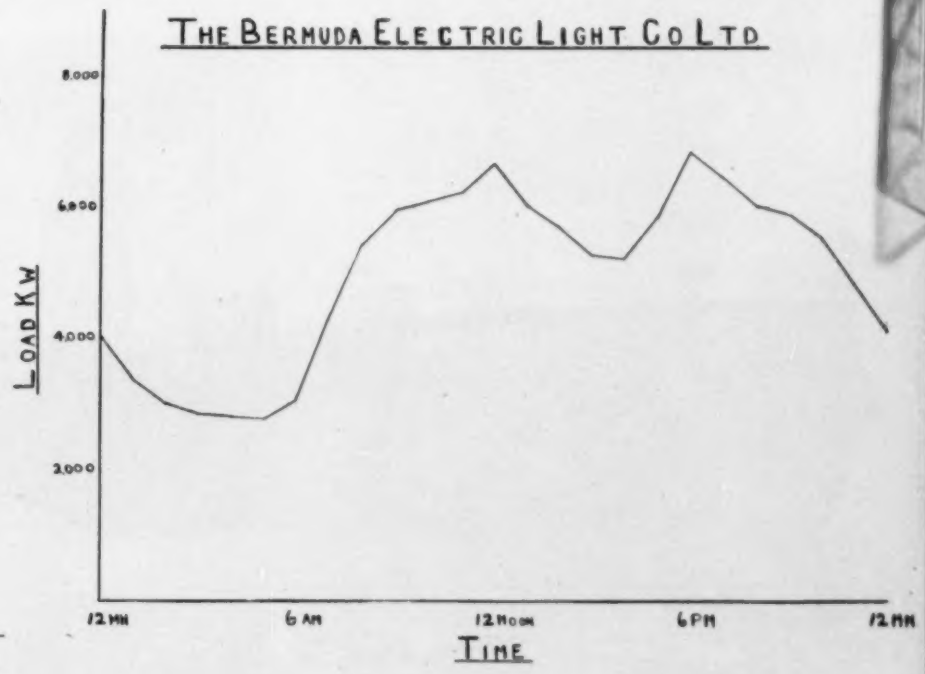


There certainly is nothing wrong with an average power factor of .81 either, and a monthly system load factor that ranges from 54% to 66%. Especially on a plant that has no industrial or commercial load. But that is the record of the Bermuda Electric Light plant for the past year. A study of the daily load chart reveals the clue to this splendid showing but there are some basic reasons beyond this. The aggressive merchandising of electric stoves, water heaters and refrigerators that the company has carried on has built the solid backlog that keeps the day and night peaks in fairly close balance and enables the plant to operate on a basis that would ordinarily be considered impossible for a domestic load.

In this land where import duty is imposed on everything that goes into the plant the cost of generation could easily be distorted. But in addition it is found that in costing out their production they are operating on the NARUC uniform system of accounting for Public Utilities under which they charge every conceivable item of expense such as double pay for some eight holidays a year, two-week vacations with pay, sick benefits and of course, repairs, operation and maintenance. And with all this the cost of production, i.e., generation, averages out just under $.01 per kwh. delivered to the power house switchboard.

The Bermuda Electric Light Co., Ltd., is a local enterprise, owned and managed entirely by Bermudians. Our hats are off to Messrs. W. E. Spurling, Basil S. Seymour, S. W. Roberts and their capable power plant staffs for their conscientious and capable management and operation of this, one of the most interesting generating plants we have ever had the privilege of presenting to the readers of DIESEL PROGRESS.





UNIQUE CARGO SHIP DIESELIZED

Two 275-hp. Fairbanks-Morse Engines Increase Speed and Maneuverability of *Michigan* Carrying Liquid and Dry Freight on New York-Detroit Run

By WILLIAM H. GOTTLIEB

THE vessel *Michigan*, owned and operated by the Michigan-Atlantic Corporation, is an unusual combination carrier that has pioneered in the transportation of liquid caustics. Today, equipped with new Fairbanks-Morse diesels and modern navigational devices, the vessel is bettering its records for speed and maneuverability in the canals, the Great Lakes, and in the waters along the eastern seaboard.

The *Michigan* was built originally as a conventional cargo ship with seven dry holds. Intended for service on the inland waterways, the vessel was kept to an over-all length of 253 ft., which could manage even the short 255-ft. locks of the St. Lawrence. Beam is 36 ft. and depth at the sides 15 ft. Fully loaded the ship draws 10 ft. of water. Gross tonnage is 1,100 and the vessel carries 1,500 net tons of cargo. Taken over by Michigan-Atlantic Corp. in 1936, the ship was converted to a versatile combination carrier and started a new and profitable career. Holds Nos. 2, 3, 4 and 6 were reconstructed to carry liquids, with Nos. 1, 5 and 7 remaining as dry holds. Covers on the four liquid carriers can be rolled back and these hold too can be used for dry cargo.

But hauling liquids is the job the *Michigan* is specially suited to do and the vessel has been employed principally to carry liquid caustics from chemical plants in Detroit to New York and liquid sugar on the return trip to Detroit. Sometimes the terminals are Philadelphia or Chicago and the cargo may be soy bean, coconut, or other vegetable oils. During the winter months, when the canal is closed, a wide variety of commodities may be carried between ports along the Atlantic coast. This versatility was built into the *Michigan* and equipment was perfected from year to year. The liquid holds, which have a comb[illegible] capacity of 250,000 gal. are in truth separate tanks within the original dry holds and have 3-ft. clearance from the ship sides and 20 in. from the bottom. Tank interiors are perfectly smooth and are coated with the plastic material Tygon. Use of the same tanks for alternate cargoes of caustics and edible oils or sugars makes thorough cleaning essential. In all the vessel's experience, there has not been a single case of cargo contamination. Another advantage of tanks separate from the ship sides and bottom is greater ease in keeping the liquids warm. The four liquid holds are fitted with steam heating coils supplied with steam by an Erie City Iron Works boiler. The four tanks also have electrically operated ventilators which circulate air and prevent condensation of the sugar.

Overhead costs remain constant and profits rise when a ship can increase tonnage carried in the course of a year. In 1950, the owners of the *Michigan* made an investment in speed and maneuverability to increase the vessel's earning capacity. The original Fairbanks-Morse engines had been in service 28 years. Modernized in 1936, they were still in top condition but they had only sufficient power to achieve a top speed under 9

miles an hour. Also, it was felt that additional power would improve maneuverability and help in getting in and out of the 38 locks on the *Michigan's* regular route to Detroit.

In March 1950, the vessel went into drydock at the Bethlehem Steel shipyards in Brooklyn. The old engines were removed and sold to a Haitian ship owner. In their place were installed two 5-cylinder Model 31A8½ Fairbanks-Morse diesels of 8½-in. bore and 11½-in. stroke. Each of these enbloc engines develops 275 hp. at an engine speed of 525 rpm. The direct-reversible diesels of the twin-screw vessel each drive through Fairbanks-Morse 2 to 1 reduction gears a 3-blade bronze Ferguson propeller of 72-inch diameter with a 46-inch pitch.

These marine diesels are very nearly self-sufficient. Each has a built-in reversible centrifugal fresh water pump and a bronze reversible centrifugal salt water pump. The engine jacket water for each unit is cooled in a No. 807 CP Ross heat exchanger with ¾-in. tubes. Temperature is maintained automatically at the desired level by a 3-in. Fulton Sylphon regulating valve which bypasses fresh water around the exchanger. There is another Ross heat exchanger to cool lubricating oil for each diesel and a 2½-in. Fulton Sylphon to regulate oil temperature. The detergent-type Socony-Vacuum lube is circulated through the engine under pressure by built-in pumps. It passes through a full-flow Cuno strainer and some of the oil by-passes through an RP3 Hilco filter with cellulose cartridges. Twenty thousand gallons of fuel are carried in four tanks—two forward and two aft—and this quantity is sufficient for a full month's operations. Fuel is pumped to individual day tanks and then to the diesels through Ellcon duplex strainers and Purolator filters.

Also built into the main engines are a pair of Fairbanks-Morse single-stage air compressors to supply air for starting. The ship also has a motor-driven Quincy compressor. Scavenging air for the 2-cycle diesels is drawn through Burgess-Manning air filters and silencers. Exhaust gases pass through Maxim spark-arrestor exhaust silencers. Beside each engine is a Fairbanks-Morse gauge board with pressure gauges on fuel, lube, scavenging air and jacket water. Also on each board is an Alnor exhaust pyrometer connected to an Alnor thermocouple at each engine cylinder. There is a Weston tachometer for each diesel. The ship has an 18-kw. Fairbanks-Morse and a 30-kw. Buda auxiliary diesel-generator set.

The owners report that the new engines have increased speed to a full 10 mph. and improved maneuverability a full 50%. The *Michigan* now makes its familiar trip up the Hudson to Troy, through the canal with 22 locks to Brewerton, N. Y., up the Oswego River with 8 locks to Lake Ontario, across the lake at full speed to Port Welland, Ontario, down the Welland Canal with 8 locks to Port Coburn, Ont., across Lake Erie at full speed and up the Detroit River to Detroit, a distance of 750 miles with 38 locks in just 4½ days.

Actually there is evidence that the new diesels can do a still better job. Exhaust temperatures indicate that even at full speed with full cargo the engines have plenty of reserve power. Studies are being undertaken to determine whether it would be desirable to install larger propellers to increase ship speed. The lines of the stern are such that propeller diameter cannot be increased but it may be feasible to enlarge the pitch. At the same time the new engines went in, Michigan-Atlantic installed some of the most modern navigational and operational equipment. One of the most important additions was RCA radar capable of picking up objects as close as 100 yds. There is a good deal of fog in the valleys traversed by the canal and on the lakes and in previous years the *Michigan* had to tie up for an average of 6 to 7 days a year. Since installation of radar, the ship has not lost a single hour because of poor visibility. Because the vessel must pass under many low bridges along the canal, it was necessary to put the radar antenna on a retractable mounting.

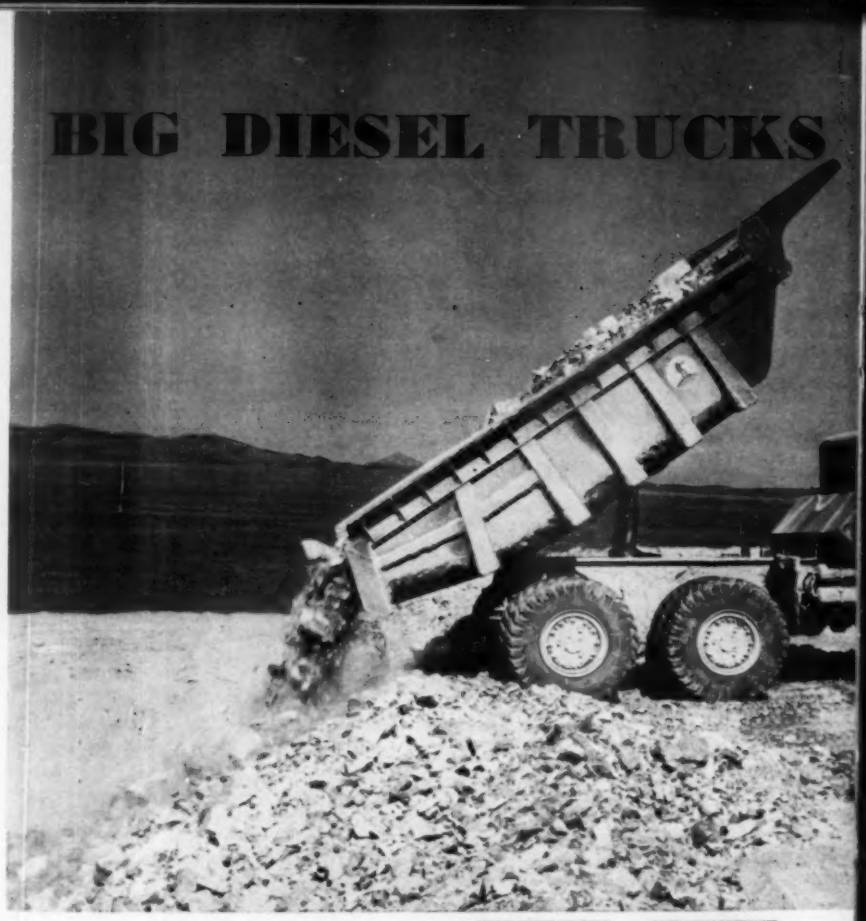
The vessel's three rudders are controlled by electric-hydraulic steering gear. Included in the new equipment is a Sperry gyroscopic pilot which automatically holds the ship on course set. The pilothouse also holds a Lorain ship-to-shore radiophone (with extension in the captain's stateroom), a direction finder, a Submarine Signal fathometer, and a Hose-McCann intership phone.

Captain of the *Michigan* is Leroy Decker. T. Johnson has been chief engineer since the company purchased the ship. The vessel carries a crew of 17, with 3 deck officers, 3 engine room officers, 6 seamen, 3 oilers, a steward and a steward's assistant. Michigan-Atlantic Corp. is under the progressive management of the three Cardillo brothers. M. J. Cardillo is president, L. M. Cardillo is vice-president, and H. R. Cardillo is operating manager. One measure of the company's progressiveness is the success of its personnel policies which include good working conditions, good pay and retirement pensions. As a result, 80 per cent of the employees of this 14-year-old firm have service records of more than 10 years. Another indication of the company's sound operating policies is the insistence on the best modern equipment. The *Michigan* is a veteran of decades of service but in propulsion engines, navigational aids and cargo handling equipment, she is one of the newest and most efficient vessels.

This is one of the two Fairbanks-Morse direct reversible diesels which have increased the speed of this cargo ship to 10 mph.

Captain Decker inspects a new RCA radar antenna which has collapsible mount to permit clearance under low bridges along the canal.

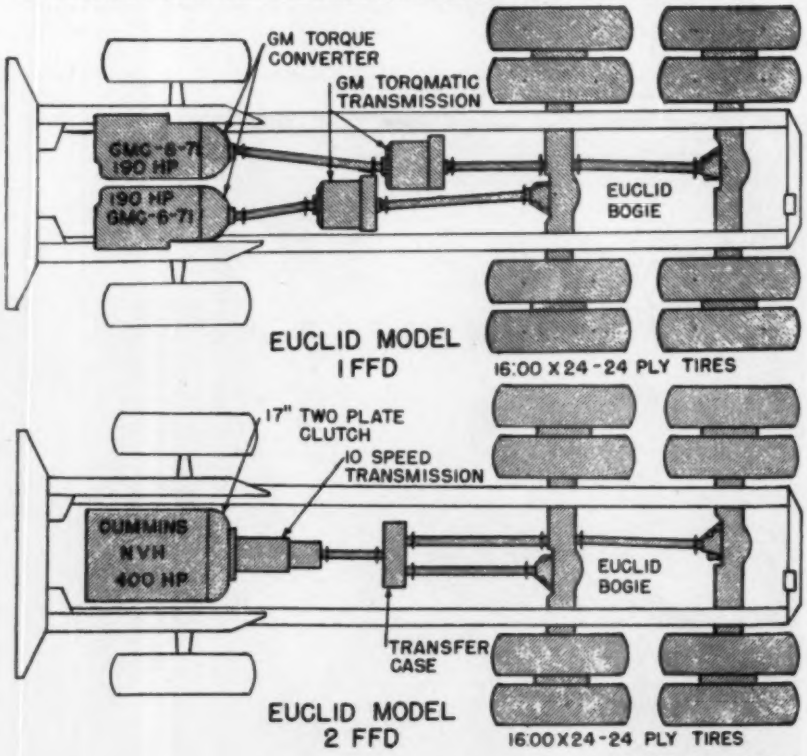
BIG DIESEL TRUCKS



DIESELS—an abundance of power in the form of the lightweight, high-speed automotive diesel engine is leading the way to larger capacity, faster off-highway dump trucks. The largest rear-dump trucks now in current production carry a 34-ton payload and use 400 engine horsepower to obtain travel speeds as high as 30 mph. Six years ago, the truck most widely used in off-highway haulage was powered by a 150-hp. diesel engine, and carried a 15-ton payload at a top speed of 21 mph. This increase in truck size, speed, and performance has been made possible by the development of diesels such as the 400-hp. Cummins NVH 12-cylinder engine and by using twin-engine installations of two 190-hp. GMC or 200-hp. Cummins six-cylinder diesels in the 34-ton truck. The trend to larger capacity trucks shows steady growth during the last five years. Open pit mining, overburden removal, and off-highway haulage in construction and industrial applications all require the lowest possible haulage cost per ton or cubic yard. Tremendous tonnages are moved by truck. For example, the M. A. Hanna Company, largest truck operators on the Minnesota iron ranges, shipped about 11,800,000 tons of ore in 1948, our biggest peacetime year. All of this ore was hauled by trucks in open pit mines, from loading shovel to dumping pocket. Because our high-grade ore deposits are rapidly being depleted, reserve ore deposits are constantly under development, and it is generally conceded that 2½ to 3 cu. yds. of dirt has to be moved to obtain one ton of ore in any new iron ore mine being opened up today. These open pit mines could not be developed economically without present day large-capacity haulage equipment. In the Pennsylvania anthracite fields, fields, the yardages being moved are fantastic, with ratios as high as 8 tons of overburden to 1 ton of coal. Twenty-five million yards of scheduled stripping on one job, sixty-six million on another and forty-one million on another are representative of huge scale overburden removal in this area, and most of this overburden must be hauled away by trucks out of pits which are several hundred feet in depth. How much is a million yards? At a typical rate of production, one truck would have to haul 50,000 loads, requiring about 12,500 hours—or 520 days working around the clock—to haul only one million cubic yards of overburden!

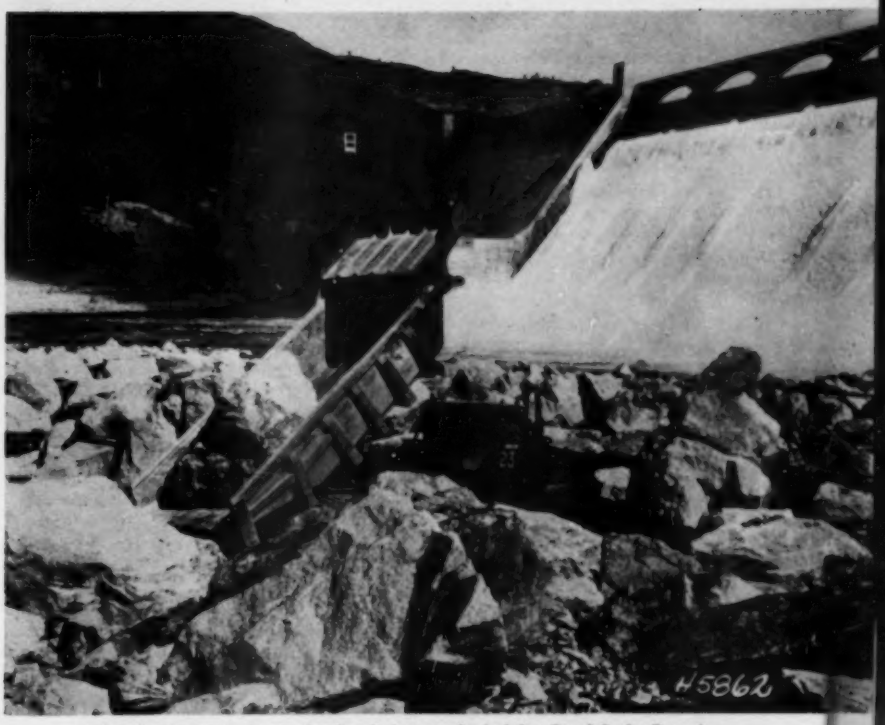
Shovel sizes have increased to a 6 or 6½- cubic yard machine, with 10 cubic yard loading shovels in the offing. For efficient loading, the truck body size must balance with the shovel size. The economic shovel-truck relationship lies within three to six bucket loads to fill a truck body without spillage. Two dippers of a 6-yard shovel will not quite fill the 15 cubic yard standard body on the 22-ton truck, while three passes result in overloading or spillage. On the 34-ton truck, four passes of a 6-yard shovel balance with a 24-yard body.

In 1949 the twin-engine 34-ton Euclid Model 1FFD was placed in operation in the eastern Pennsylvania anthracite field, and in the Mesabi Iron Range in Minnesota. These trucks are powered by two GMC Series 6-71 diesel engines. The two GMC diesels have a maximum rating of 380 hp., driving



*Manager, Sales Development, The Euclid Road Machinery Company.

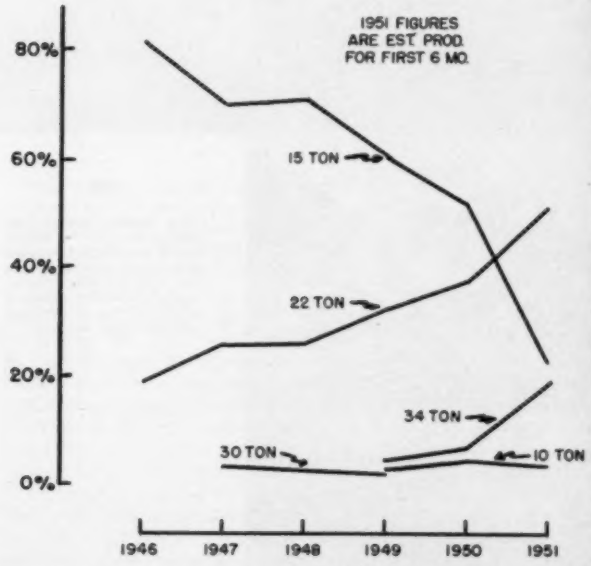
By: Alan S. McClimon*



These huge armor trucks are placed on both stream banks below Grand Coulee Dam. A barge ferries the loaded truck across the Columbia River for placement of rock on the far bank. Photograph by courtesy of Morrison-Knudsen.

Euclid 54-ton tandem axle truck on waste dump, stripping iron ore deposit in Utah. This is a single-engine 400-hp. installation. The diesel is a single 12-cylinder 400-hp. Cummins.

PERCENTAGE OF REAR DUMP TRUCKS PRODUCED IN EACH TONNAGE SIZE BY ONE MANUFACTURER



Mack 30-ton truck powered by Cummins NVH diesel. Note twin exhaust stacks, and large air cleaner just ahead of right cab door. This unit is operating in Minnesota in the iron country.

through two Allison torque converters and Allison semi-automatic planetary transmissions, into a tandem drive axle. Each of the two power trains are independent, and drive through separate driveshafts to each of the two drive axles. One throttle controls both engines. Engine synchronization is accomplished through the torque converters. Each engine, of course, has its own electric starter. The left-hand engine drives the fan, generator, and body hoist pump, while the right-hand engine drives the air compressor, steering booster pump, and a second body hoist pump to double the volume to the hoists for fast dumping time.

Actual job studies on a stripping operation show the following comparison between 22-ton and 34-ton trucks:

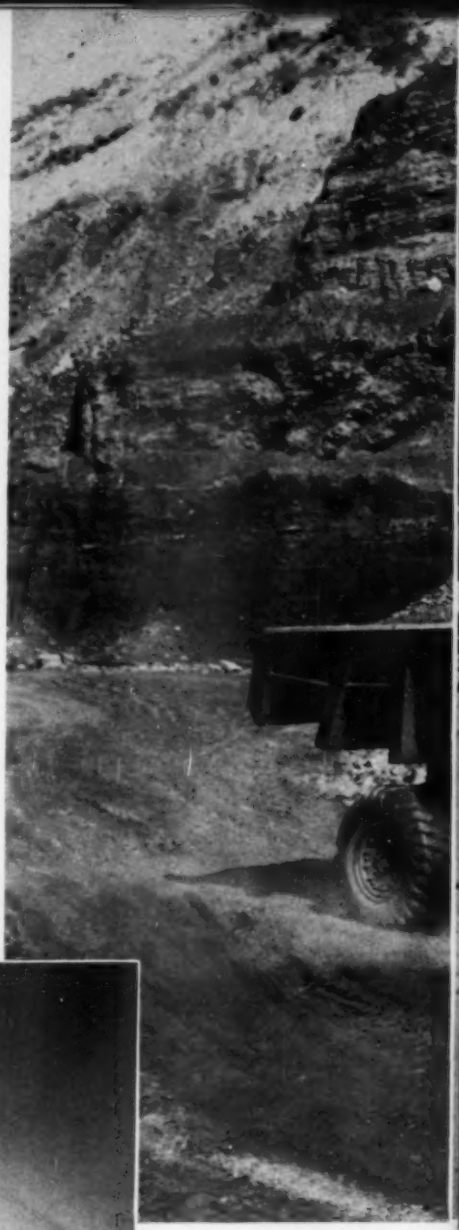
	22-Ton Truck	34-Ton Truck
Load with 6 cu. yd. shovel..	.80 min.	1.44 min.
Haul 7,310 feet, adverse grades 3% to 9.7%.....	7.45 min.	8.28 min.
Spot and dump.....	.75 min.	.72 min.
Return empty to loading shovel 7,310 feet.....	4.01 min.	3.08 min.
Spot at shovel.....	.41 min.	.37 min.
Delay at shovel	.40 min.	.40 min.
	13.82 min.	14.29 min.
Number trips per hour.....	4.34	4.2
Average return speed.....	20.7 mph.	27 mph.
Tons per hour, 1 truck.....109		176

On this job the 22-ton truck was faster on the loaded haul by .83 minutes, because the drivers consistently obtained the best performance out of a 10-speed conventional transmission by double clutching and cross shifting.

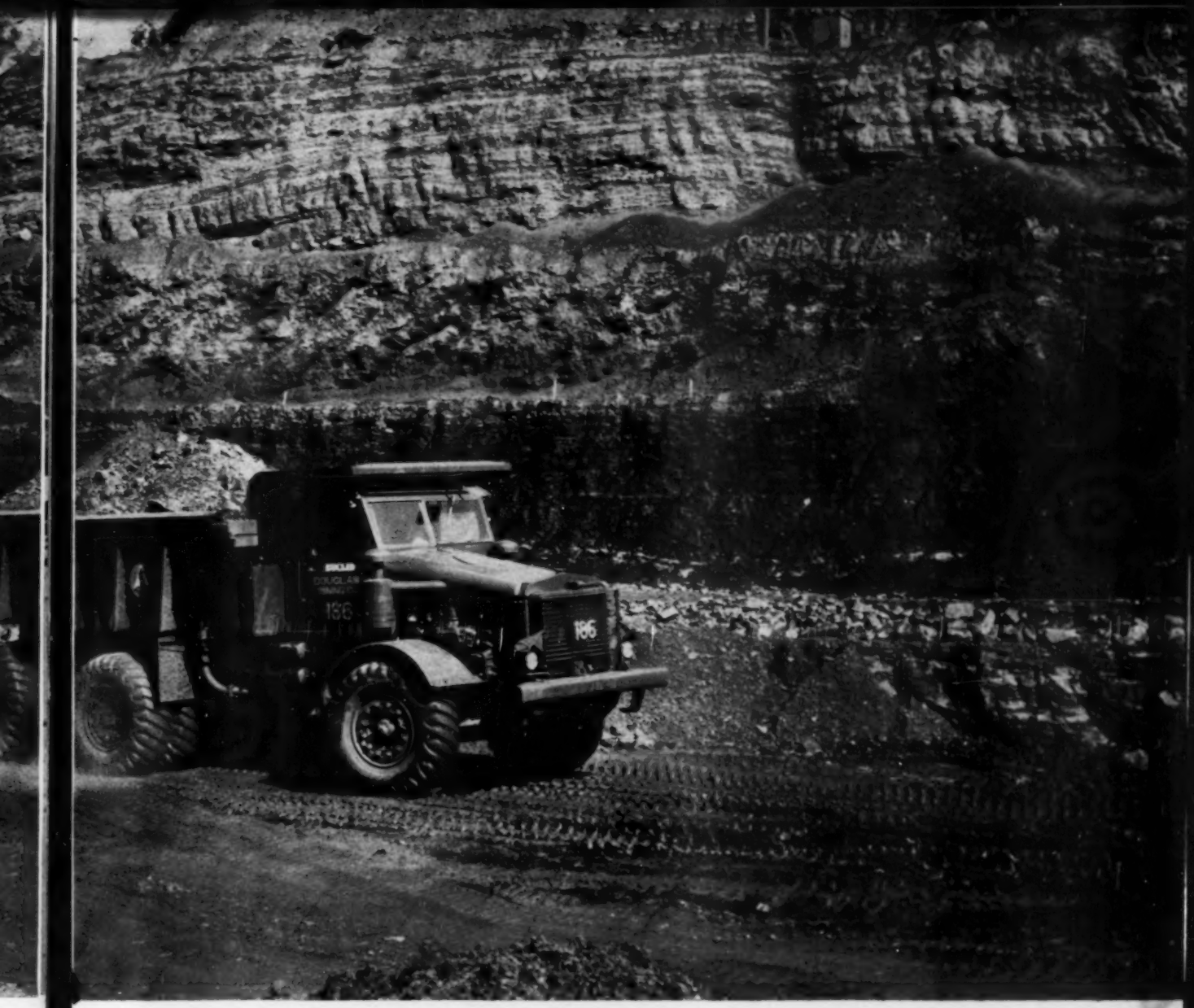
Torque converters in the 34-ton truck take the "work out" of driving and the improved riding quality of this latest model off-highway truck has resulted in .93 minute faster return trip time.

On this typical installation, using a large loading shovel, with adverse grades over long distances on the haul road, and excellent roads permitting high return speeds, the 34-ton truck shows a productive gain over the 22-ton unit of 61%. Small wonder, then, that off-highway dump trucks have grown from 15 tons capacity, through 22, and then to 30 and 34-ton trucks, with the ultimate economic limit not yet clearly defined. Prior to 1949 there were relatively few 30-ton trucks in operation. This truck size, offered by several different manufacturers, was powered by diesels with a maximum rating of 275 hp. which was exactly the same amount of power used in the 22-ton truck. As a result, the 30-ton truck was a relatively poor performing unit. It had 420 lbs. of gross weight per hp., compared with 305 lbs. of gross weight per hp. for the 22-ton truck. It had to be very carefully fitted to the job, lest its slow speed on grades, its tendency to lose speed rapidly on soft haul roads, and lack of accelerating ability resulted in a penalty, not a gain in production and economy over the 22-ton truck. Thus, until recent years, the limitation in hauling large payloads had been in engines, with the maximum size single diesel engines on the market developing 275 to 325 hp.

Huge scale open pit copper mining requires large shovels and truck to form this man-made Grand Canyon. General Motors diesels are installed in this job.



Twin Engine 34-ton truck hauling ore on the Mesabi Iron Range which is equipped with a pair of General Motors Series 6-71 diesel engines with a maximum rating of 380 hp. driving through two Allison torque converters.



Because of adequate power-to-weight ratio, and the advantages of torque converter drive, this twin-engine truck was well accepted in large-scale earthmoving. Typical job applications are: Stripping and ore hauling in Minnesota, overburden removal in Pennsylvania, stripping of copper ore deposits in Arizona, and hauling of chunks of granite armor rock, 3 to 30 tons each to protect the downstream banks below Grand Coulee Dam. During 1949 there were experimental installations of the Cummins Model NVH 12-cylinder diesels in a Dart tractor-trailer coal hauler, operating in a Missouri strip mine, and in a 30-ton Mack, operating in Minnesota. The supercharged version of this same engine, developing 550 hp., had been in experimental use as early as 1947 in a 40-ton truck. The NVH is a V-type engine, 5¼-in. bore by 6-in. stroke, with a total piston displacement for 12 cylinders of 1,486 cu. in. Maximum torque is 1,070 lb. ft. at 1,200 rpm. Maximum rated horsepower is 400 hp. at 2,100 rpm. During 1950 the satisfactory development of the 400 hp. diesel resulted in fleet installations of six 34-ton trucks in an iron ore stripping operation in Utah, quickly followed by a fleet of six 30-ton tandem axle trucks at one Mesabi Range mine, and twenty-eight of the 34-ton units being installed at other mining districts throughout the Mesabi. There are four different power train arrangements in the Euclid FFD model, using either a single 12-cylinder NVH with conventional transmission, *or* with Schneider torque converter, or by using twin GMC or Cummins Model NH 200-hp. engines with Allison converters and Allison Torqmatic transmissions. The accompanying chart illustrates these four methods of transmitting power to the tandem rear axle.

Single engine 400-hp. installations with 10-speed transmission are in use at the present time, although the trend is toward torque converters because of better performance on variance grades and roads, and because of better acceptance by the drivers. Although twin-engine power has not been popular in the past, the twin engine converter installations for off-highway haulage are "here to stay" in the opinion of Euclid engineers. Use of two relatively low-cost diesel engines of high production volume, coupled with torque converters for power transmittal, permit design of a high-performance truck at low initial investment. But the final proof is in the field and by June, 1951, there will be several hundred 30 and 34-ton trucks in operation in the United States, both twin-engine and single-engine types, with diesel engine power lading the way to lower haulage costs.

CRANKSHAFT REGRINDING

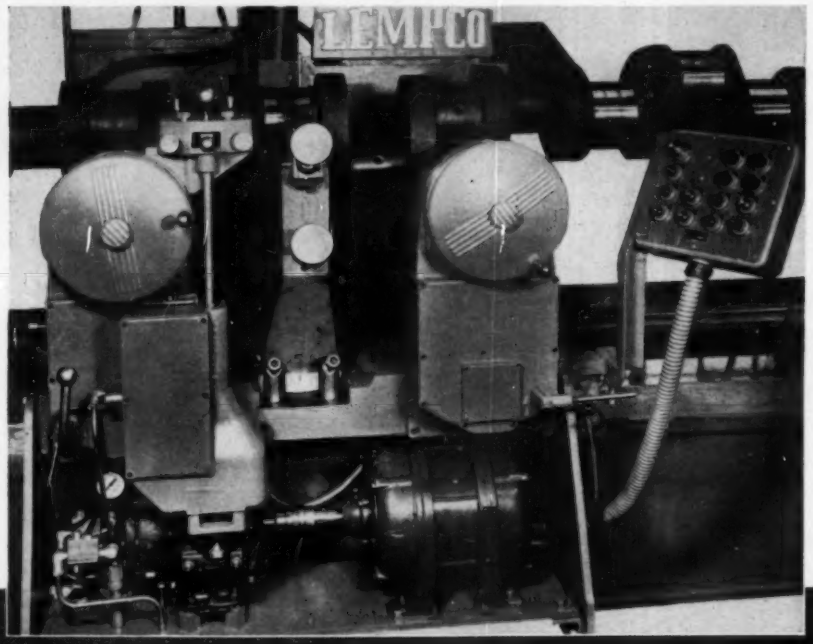
By WILBUR W. YOUNG

DIESEL crankshaft regrinding is a growing industry. It grows in magnitude as the number of engines in daily operation increases because under normal conditions every engine installed remains in service indefinitely. Through the repair, replacement and salvaging of worn or damaged parts, the ultimate life of an engine may be extended over an indeterminable period of years. The practice of crankshaft regrinding increases in economic importance because the first cost of the shaft itself, represents 10 to 15% of the total cost of the engine. Furthermore the time required for regrinding may be expressed in terms of days, whereas an engine may be out of service for months awaiting a new shaft.

Estimated to be in service in the United States at the close of 1950 are some three and a half million diesel and gas engines of all sizes and types. Of these, approximately 15% or 500,000 engines are fitted with crankshafts of such sizes that anything short of reclamation when they become worn or otherwise unserviceable would represent serious economic waste. The railroads alone are adding over three thousand diesel units per year in locomotive service and their schedules of preventive maintenance call for the utmost in salvage of reusable parts. Generally these schedules indicate regrinding of locomotive crankshafts after 150,000 miles of service. With diesel locomotives averaging better than 90% availability it is seen that crankshaft regrinding periods occur frequently.

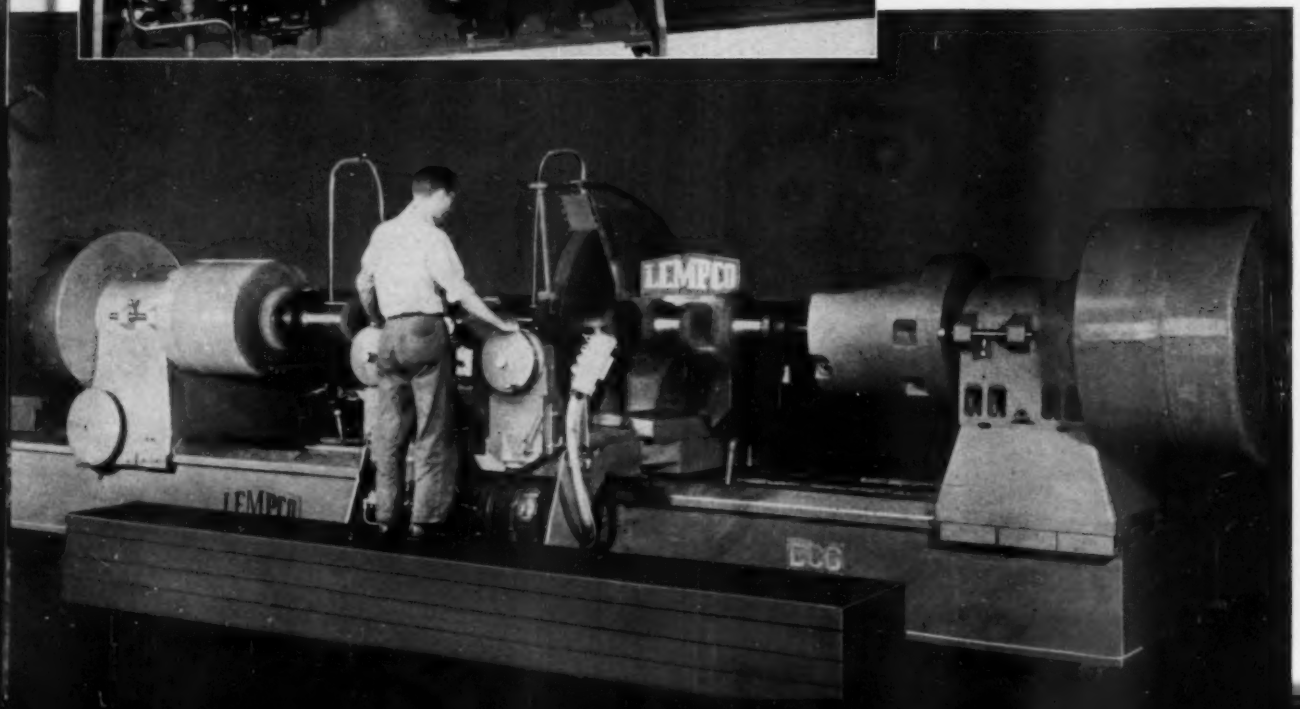
On the other hand crankshafts in heavy duty, slow speed engines may, under normal conditions, operate 20 to 30 years before regrinding is indicated. But the number of 20 to 30-year-old engines is increasing daily, hence the volume of regrinding work is likewise growing.

It is not our purpose here to discuss regrinding methods since they have been highly developed by the manufacturers of the tools which do this work and by the users of such tools. Generally however, the objective sought in regrinding is to correct tapered, scored or out-of-round conditions. Often the removal of 1/32 in. or less is enough to accomplish the necessary correction. Again the condition of the shaft is such that as much as 1/16 in. has to be ground off. And when grinding has penetrated to practical limits which are dictated by depth of surface hardening, the requirements of the engine builder and various other factors, there is still another method of salvaging this costly piece of equipment. This is the recent development of a scientific plating process



Hand controls for close regulation of wheelhead are seen right and left center. The panel, right carries control buttons for all automatic operations and signals indicating lube and hydraulic pressures.

Here the grinder is seen in full operation with the wheelhead moved to the center of the shaft. Work remains stationary endwise, while the grinding wheel is moved from journal to journal.



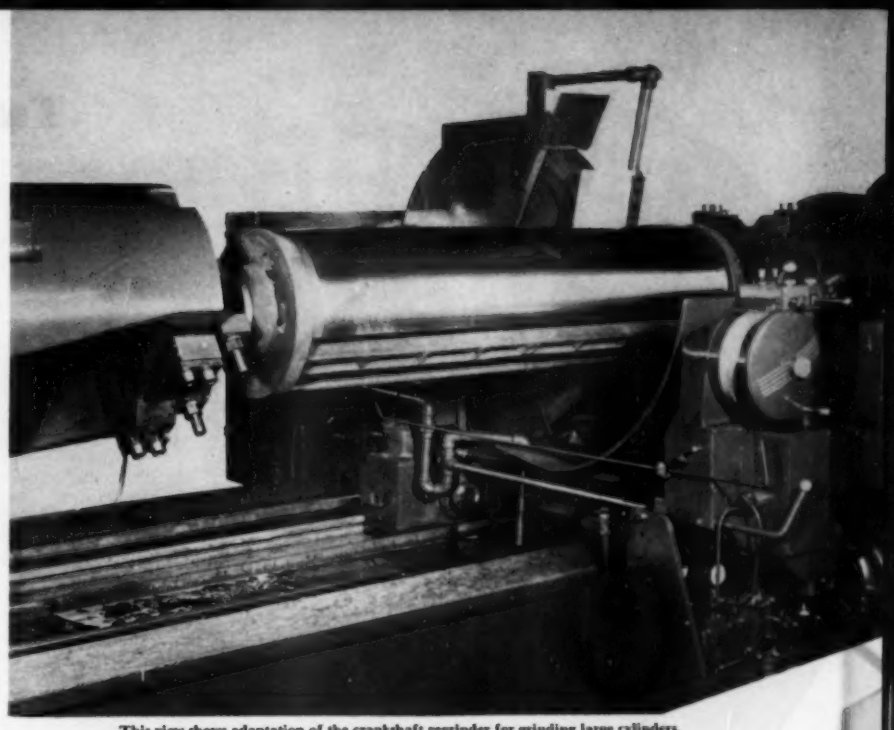
by which additional metal is built up on undersized crankshaft journals. Developed by Van der Horst Corp. of America, this process is known as VanderloyM, and it is gaining recognition among engine users whose service requires the utmost in crankshaft salvage.

After the plating process, which literally fuses metal to the worn parts to a depth beyond standard limits, the journals are reground back to standard sizes. This procedure obviously eliminates the necessity of carrying odd sizes of bearings and it results in economies of time, materials and labor.

A recent contribution to the art of crankshaft regrinding is the introduction of a machine which employs the principle of the traversing wheel head. Long recognized as a sound principle in machine tool design, the idea of bringing the tool or grinding wheel to the work is for the first time exemplified in this new diesel crankshaft regrinder. Because the wheelhead traverses the work, this machine can handle crankshafts up to 16 ft. in length, occupying approximately half the longitudinal floor space as a machine in which the work traverses the wheel.

Taking a cue from many of the diesel engine builders, the designers of this crankshaft regrinder have made the base of the machine as a single unit weldment with all stresses and strains removed. The cast wheelslide, headstock and tailstock are mounted on the fabricated base with the first two mentioned units sliding on hardened steel, hand scraped ways. The ways, bed unit and coolant tank are an integral part of the base. This construction reduces weight, increases strength and is more readily relieved in case of damage or wear.

An interesting and time saving feature of this machine is embodied in the patented balancing system mounted outboard of the headstock and tailstock. Instead of adding or removing counter weights to balance the shaft before or during regrinding it is only necessary to mount the shaft between headstock and tailstock, multiply weight of the shaft by the throw and adjust a direct reading pointer to that figure on the fixed scale. Shaft is thus automatically counterbalanced.



This view shows adaptation of the crankshaft regrinder for grinding large cylinders.

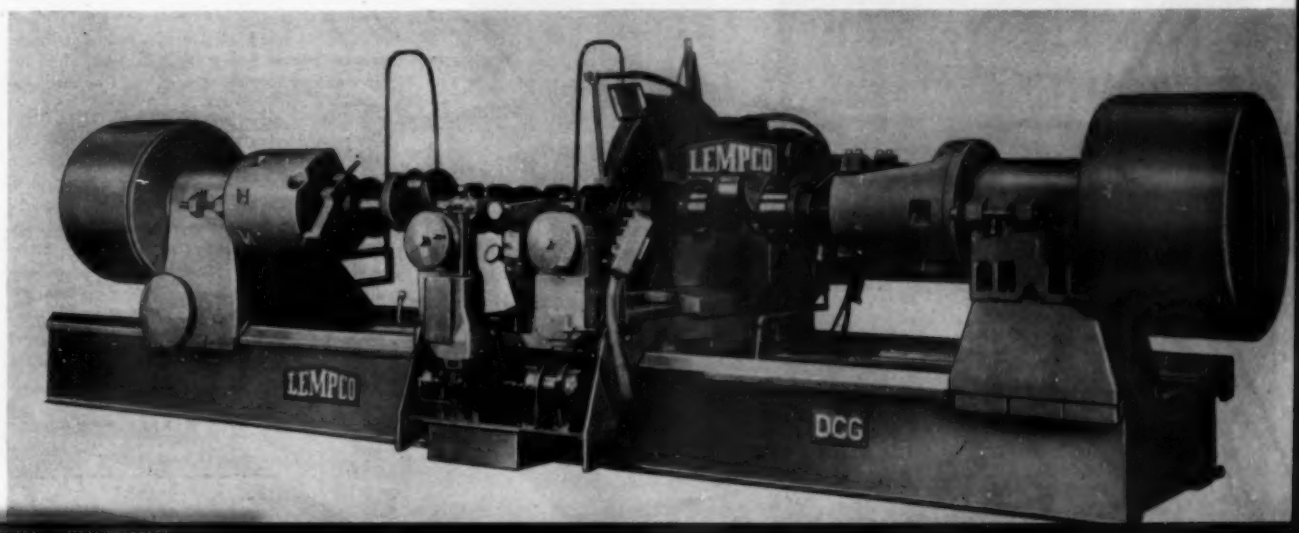
The tailstock is stationary longitudinally but it is arranged for centering for main journal grinding or for throwing the shaft off center to grind the rod journals. The entire tailstock may also be moved one-half an inch crosswise to correct for crankshaft taper.

All essential moving parts of this grinder are pressure lubricated. Before starting the machine the lube oil pressure must be up to 50 psi. on the wheel head spindle. If the pressure falls below 50 psi. while the machine is in operation it is automatically stopped. Likewise the hydraulic unit which moves the wheel head into and away from the work is set for 500 psi. and failure of the pressure automatically shuts down the machine.

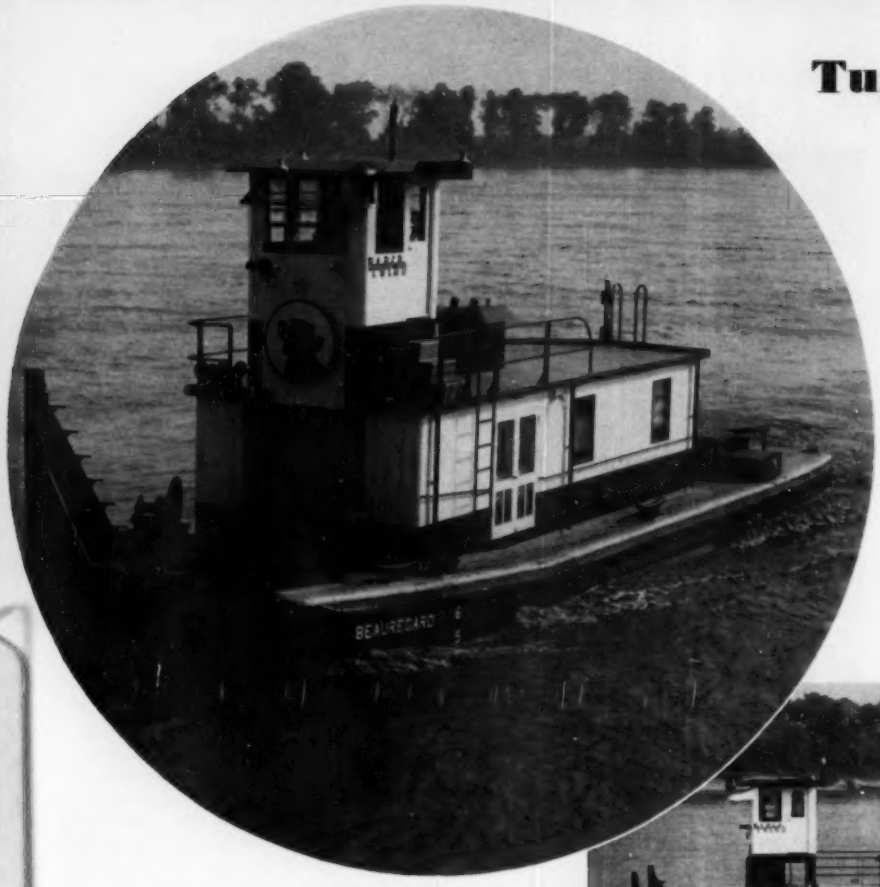
The wheel head is moved hydraulically and rapidly, to a point close to the work and then it is hand fed to grinding position. The hand feed is graduated to .001 in. The hand feed for sidewise traverse is graduated to .0001 in. This combination of hydraulic and hand controls on the wheel head gives speedy, accurate and infinite adjustment of the grinding wheel both traversely and longitudinally. The work is anchored in 24-in. diameter pot chucks which are removable and which can be adapted with centers and index plates to handle special crankshafts.

It is seen that this new approach to diesel crankshaft regrinding tends to speed up the operation and thereby to reduce engine down time. Also that the shorter, lighter weight machine described here represents considerable savings in first cost, shipping charges and maintenance while it is admirably suited to the exacting requirements of this important operation. The other step in effecting full recovery of crankshafts aside from the repair of breaks, is that of straightening bent shafts.

Overall view of the crankshaft grinder with work in place. The 24-in. pot chucks are seen on head and tail stocks and automatic balancing mechanisms are housed in the large outboard bells at each end.

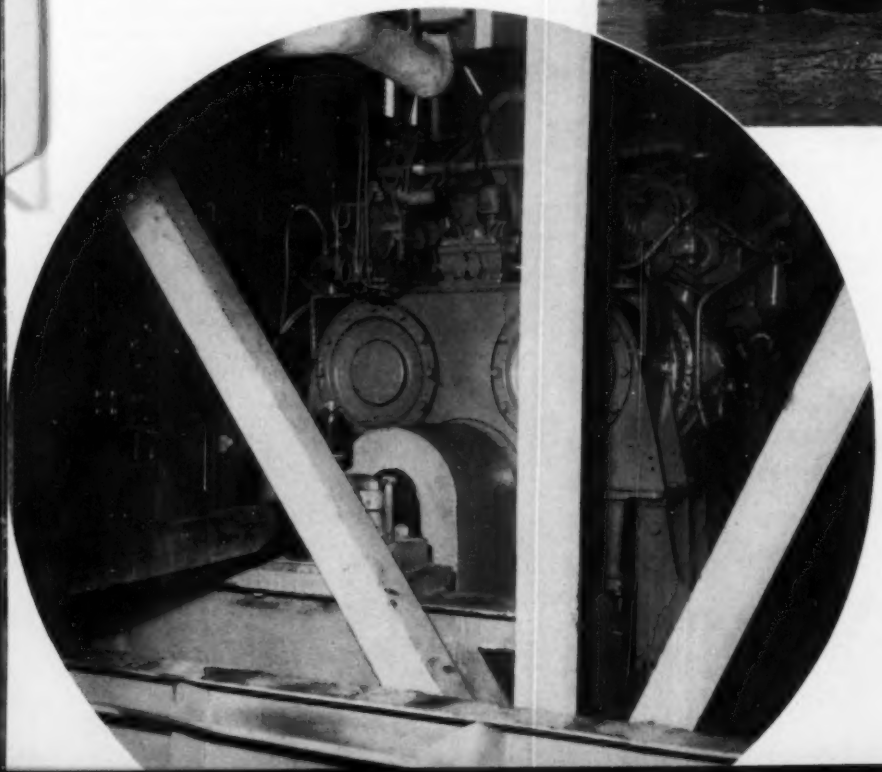


Tug "Beauregard"



NOT LONG ago the Bull Towing Company of Chicago, Illinois, built the *M/V Ferdinand*, named after Walt Disney's "bull with the delicate ego." The *Ferdinand* soon became known as "the boat with a definite push," and in this short time has already acquired a partner, the *M/V Beauregard*. The name "Ferdinand" was a natural for the Bull Towing Co., so in deciding on a name for the new towboat, Mr. Bull cast around for the name of some other famous young bulls and "Beauregard" seemed to be a natural. Just as the *Ferdinand* was designed and built by the St. Louis Shipbuilding & Steel Co., so was the *Beauregard*, and already this new towboat is at work. Of all-steel welded construction, the *Beauregard* has a hull 56'x15'x7'0" with a normal draft of 5'. Like the *Ferdinand*, the *Beauregard* is a single screw towboat, equipped with a Kort nozzle to give it more effective push. There is a single steering rudder and two backing rudders, all controlled by a St. Louis Ship electro-hydraulic steering system with electric follow-up

General Motors twin diesel 6-71 developing 260 hp. at 1,600 rpm. installed in *Ferdinand's* brother *Beauregard*.



controls. The main propulsion engine is a General Motors Detroit twin diesel 6-71 developing 260 hp. at 1,600 rpm., fitted with a 4-1 reverse and reduction gear and pilothouse controls. Besides the battery charging generator on the main engine there is a 3 kw. 32 v. U. S. Motors auxiliary generating set and Exide batteries furnished by the Electric Storage Battery Co. A Carlisle & Finch 10" incandescent searchlight is mounted on the pilothouse.

The deckhouse and pilothouse are of steel construction, lined with masonite and insulated with 2" of fiberglas. All sash except the forward pilothouse are Truscon steel. The pilothouse can be raised or lowered for operation in the Chicago area. The deck is provided with ample fittings and two Beebe all-Steel single drum, 2-speed, 5-ton hand hoists for assistance in making up tows. Reports as well as tests indicate that the *Beauregard* takes after the Ferdinand in maneuverability and push and is doing a good job in and around the Chicago area.

P&H DIESEL ENGINES

2-CYCLE

SHOCK LOADS

EVERY 30 SECONDS

That's normal operation for power shovels—the toughest assignment known for diesel engines. It's the service P&H Diesels were designed to take. Years of superior performance, attested by hundreds of users, prove that P&H Diesels can take *any* of your toughest jobs in stride. It's one reason wise users are standardizing on P&H Diesels. There are many other reasons worth learning. For literature, write Diesel Division, Harnischfeger Corporation, Port Washington, Wisconsin.

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High-Speed Diesels . . . Design, Operation & Maintenance

CONDUCTED BY H. G. SMITH

DIESELS & LUGGING POWER

THE HIGH speed diesel engines have done such a marvelous job in so many fields that it is hard to pick out which application has been the most outstanding. Actually it seems that the shovel and drag line is near the top of the list probably because the diesel performance matches so closely their requirements. Steam was the only power used originally and continued to be the major source of power even after the gasoline engine became popular in many other pieces of equipment and before the advent of the high speed diesels. The lugging power that steam gave to the shovel was so essential that it took the shovel engineers quite a while to figure out how this performance could be duplicated with the use of a gasoline engine. The fact is, it never has been able to do it quite as well, except in the smaller shovels, because when the engine was pulled down to a speed where the torque started to reduce it would stall unless the operator was on his toes and quickly released the load.

Larger flywheels with more stored energy were used with some success but this arrangement was not entirely successful because they would retard acceleration and not let the engine get back up to speed immediately after a cycle. The high speed diesel engine with its greater lugging ability more nearly duplicated steam power and they met with immediate approval. Today a steam shovel is somewhat of a novelty all because the diesels gave good performance and immediate availability with low operating cost.

There is one point about the diesel engine that is not generally known that makes them superior to the gasoline engine for such types of installations as shovels and other pieces of equipment that require low speed torque and lugging ability. That point is one of the greatest differences between gasoline and diesel engines which has made it possible for them to displace the gasoline engine in so many places. It is the possibility of changing the peak of the torque to different speeds by minor adjustments. To change these points of a gasoline engine usually requires different camshaft timing, intake manifolds, carburetor settings and ignition timing all because the fuel being sucked into the engine is dependent upon the velocity of the air passing through the carburetor and intake manifold. In the diesel engine there is an unrestricted open intake passage into the cylinders for the air to get in regardless of load and speed and the fuel is injected mechanically in a definite quantity without regard to the air and by varying the fuel alone the torque can be changed to suit the equipment's requirements.

Often the question is asked of the diesel engineer, "What is the most efficient speed of his engine?" The answer is not so difficult for the gasoline man because he has more or less a fixed speed, but the diesel man can answer with the question, "What power do you want at what speed?" This flexibility of power and torque characteristics of the diesel engine has caused the writer some embarrassing moments. After studying the prospective customer's requirements, he has presented a power curve which would be suitable for the customer's proposed machine and the curve in many cases was quite different from the published literature. Sometimes it took quite an argument to convince the man that this same engine could and would perform to the two different curves.

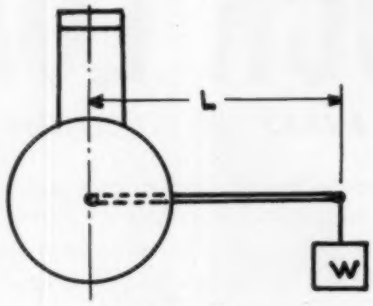


FIG. 1

Although this article started out discussing the shovel situation, it equally applies to boats, air compressors, oil field equipment, pumping graders, logging and all kinds of equipment that requires special torque conditions. While on the subject of torque, it may be apropos to give you a few simple statements as to what is meant by the word torque as applied to engine ratings. To state it simply, it is the ability of the engine to "twist." Webster states that torque is "the moment of a force applied to a machine which causes it to rotate." When an engine is rotating, it is being pushed around by the explosion pushing on the piston and the piston through the use of a connecting rod pushed the crankshaft around.

Referring to Figure 1 will help you grasp what this means. If you would hang a weight "W" at the end of a lever "L" which is attached to the flywheel and increase this weight until the engine could not rotate you then have found the maximum weight the engine could lift. By multiplying this weight by the length of the lever, you have found the turning ability or twisting power of the engine. All engines are tested by connecting them to a machine called a dynamometer which is so designed that this maximum weight or load can be determined at any speed desired, the lever and weight being part of this machine. The results are computed and expressed in "foot pounds torque." Horsepower is figured from these torque results, one horsepower being the energy needed to lift 33,000 pounds one foot in one minute. The fact that you may have an engine in your piece of equipment that is rated at so much horsepower and the other fellow has a similar machine in which the engine is rated at a different horsepower does not necessarily mean that the one with the higher horsepower rating will out-perform the lower rated job. The amount of torque and at what speed it is obtained is more of a governing factor than the horsepower on performance.

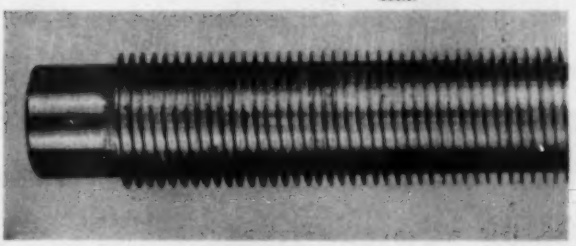
When you hear someone talking about the great lugging ability of his machine he is talking about an engine that has high torque. It all adds up to the fact that if you have in mind any piece of machinery that needs dependable power and you want it to be a work-horse, the high speed diesel engine with its low speed lugging force is certainly the answer. It can be made to suit your special requirements.

For dependable cooling of Lube Oil and Jacket Water

WATER COOLED LK·FIN COOLER

AIR COOLED FIN·FAN COOLER

G-R Type LK-Fin Tubular Cooler with helically-finned tubes



Portion of LK-Fin heat transfer element used in the LK-Fin Cooler

G-R offers a choice of *two* efficient and reliable units for maintaining the lube oil and jacket water of your Diesel engines at the correct temperatures for best operating results.

If you have a sufficient supply of raw water, select the LK-Fin Cooler. This tubular exchanger has finned type cooling elements with four times the heat transfer surface of bare tubes. As a result, the LK-Fin Cooler is far more compact, besides being lighter in weight and less costly than bare-tube units for the same duty. In addition, the LK-Fin Cooler has several other distinctive features that provide effective design and long-lived construction with economical maintenance.

If your raw water supply is insufficient or undependable, the Fin-Fan Cooler will provide effective cooling by air. This unit, developed jointly by Griscom-Russell and Fluor Corp. Ltd., is in wide use on a great variety of cooling and condensing services. It operates entirely independent of the direction or velocity of the wind and may be installed wherever convenient, within a building, or on the ground, or on a roof.

The cooling elements of the Fin-Fan Cooler, like that of the LK-Fin Cooler, have helical fins originated by Griscom-Russell for more efficient cooling. This design, developed more than 25 years ago, has proven its effectiveness and durability in many tens of thousands of cooling and condensing units.

Write for complete data on whichever type of G-R Cooler best meets your cooling water conditions, and information will be sent you without obligation of any kind.

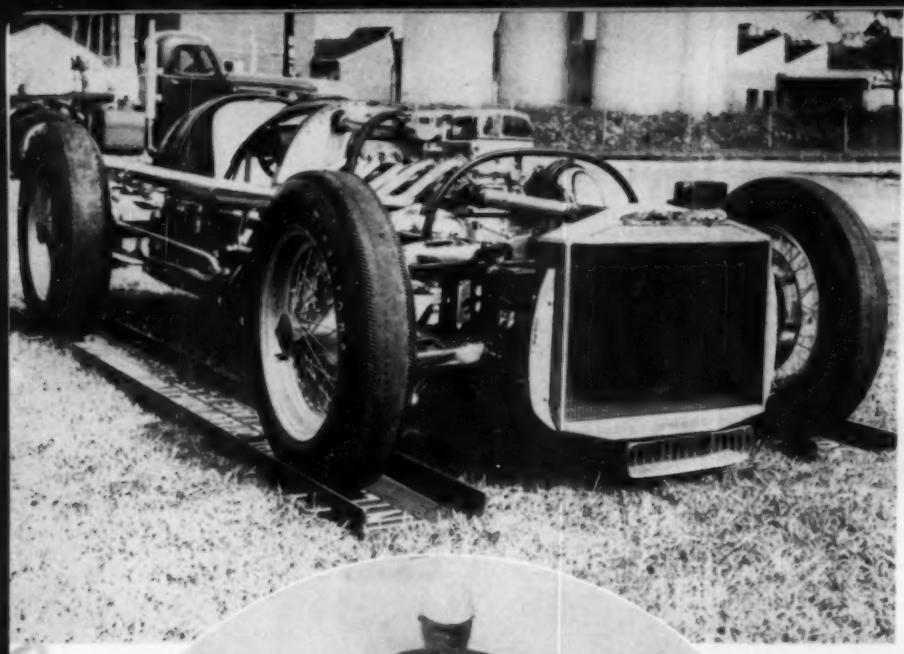
Fin-Fan Air-Cooled Heat Exchanger, showing G-R K-Fin Cooling Sections on top of the structure and with part of the side wall cut away to show the motor-driven fan

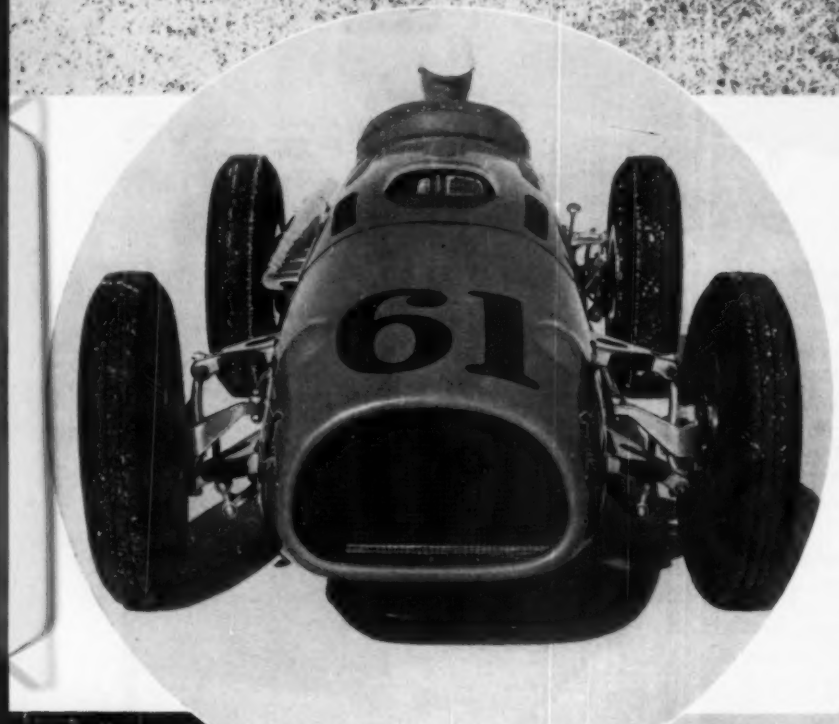
THE GRISCOM-RUSSELL CO., 285 MADISON AVE., NEW YORK 17, N. Y.

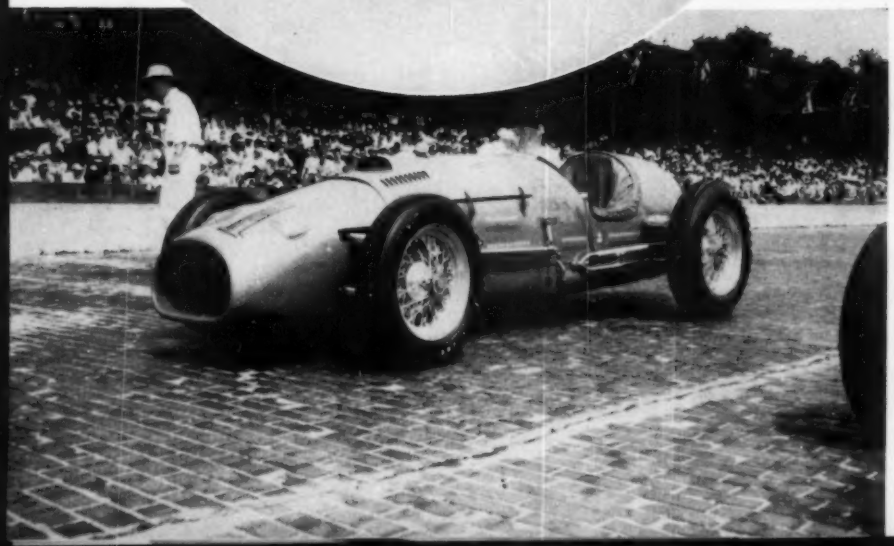
GR-350

GRISCOM-RUSSELL

PIONEERS IN HEAT TRANSFER APPARATUS







RESEARCH WITH A SPORTING FLAVOR

By WILBUR W. YOUNG

THE classic "500" automobile races at Indianapolis have long been recognized as the proving ground for many of the greatest advances in automotive design. And we find, looking back in retrospect at the races held last May, one event that fits into the pattern of this tradition. This was the qualification of the Cummins No. 61 diesel race car at an average speed of 129.208 mph. during the fastest time trials in Speedway history.

It is of small moment now that in the race itself the Cummins diesel car was forced into the pits on the fifty-second lap because of an accessory failure. Outstanding is the fact that this car carried the first competitive diesel in race history and the same machine hit 165.23 mph. later in the year on Bonneville Salt Flats, thereby breaking four international diesel records and setting six new records for diesels.

Why? Well, the Cummins officials answer this question frankly when they say that they wanted some quick, effective engineering research with forced time limit, such as a race day deadline. Did they realize their objectives? Here are the facts demonstrated by these two speed tests and let the reader be the judge. 1. Smokeless combustion can be attained at high engine speeds with little loss of efficiency. 2. Standard diesel fuel—the same kind as is burned in home furnaces—is satisfactory for high-speed, smokeless combustion. 3. Standard mechanical features such as timing, valve settings, etc., are fully adequate for high speeds. 4. The weight of a standard truck engine was reduced more than 45 per cent (to 2.06 pounds per horsepower) while more than doubling horsepower and engine rpm. for experimental purposes.

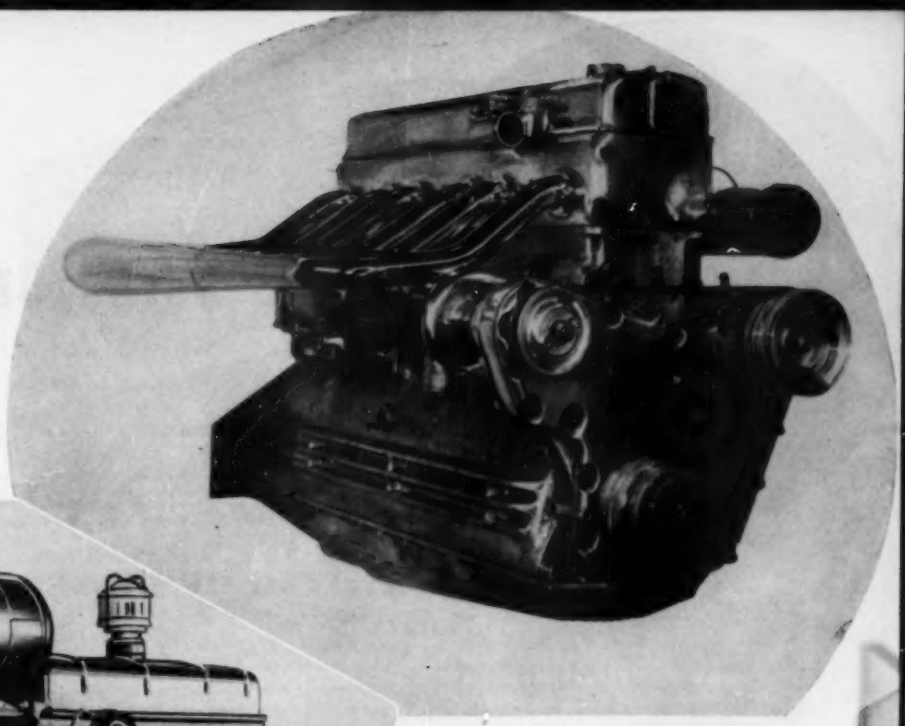
To lighten and soup up their standard JBS-600 cast iron diesel engine of 150 hp. at 2,500 rpm. and 10.2 pounds per horsepower designed primarily for medium weight highway truck service to one of 340 hp. at 4,000 rpm. weighing only 2.06 pounds per horsepower in a few months, was the task the Cummins organization set and the blow-by-blow account of this development is not without compelling interest.

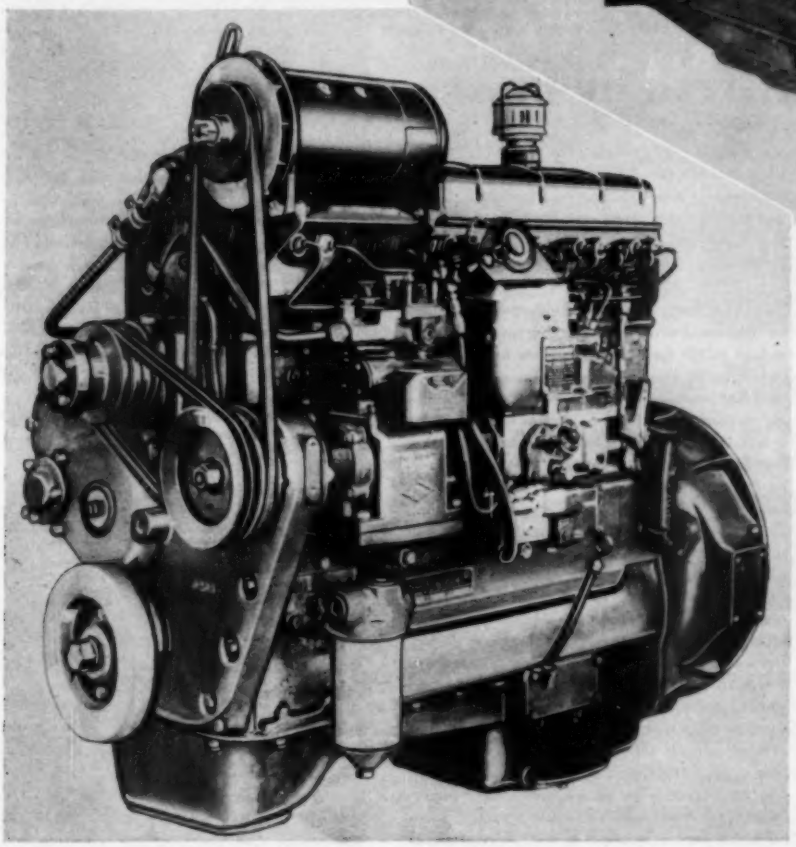
Having determined late in 1948, that a market and a need existed for a medium duty truck engine of 140 to 150 hp. at 2,500 rpm., the Cummins laboratory worked on the problem rapidly during 1949 and by the end of the year released for production a 6-cylinder, supercharged 401 cu. in. diesel, of 4½-in. bore, and 5-in. stroke rated 150 hp. at 2,500 rpm., weighing 1,545 pounds, or 10.2 pounds per horsepower. This is the Model JBS-600, which

was produced in limited numbers during 1950 and is marketed under Cummins' standard merchandising plan and its "100,000 Miles or One Year" warranty.

At the end of 1949, just as the Research Laboratory was making the final releases of the JS-600 to production, the possibility of entering a race car in the 1950 Memorial Day 500-Mile Race in Indianapolis came up for consideration. If a race car powered by the basic JS-600 could be developed, there were several reasons why 1950 would be a particularly opportune time.

First—a Cummins entry in the racing field would be in line with the company tradition. The founder of the company, Mr. C. L. Cummins, rendered his company, and the diesel engine industry generally, an invaluable service in 1931 and 1934 with diesel entries at that time by calling attention to the fact that there was a diesel engine, a form of power other than gasoline, and that these engines were light enough, fast enough, and powerful enough to ride on wheels. These entries, however, were not competitive cars, as the development of the diesel engine had not reached that point. It was thought that it would be well to show in 1950 that the diesel has now grown up to the point where it can compete with the best in the gasoline field. Second—This would be an opportunity to accelerate the development and extend the horizons vastly in one step. It would be a research program with a sporting flavor. Third—there was a third compelling reason for entering a car, for the race would be about coincident with the introduction of the commercial version of the "JS" engine.





With these reasons for considering an entry, the Research Laboratory was asked by the management if it were possible to "soup up" a basic "JS" engine to the point where a creditable showing could be made. The development of the racing engine stems from that request, which was made on the day before Christmas, 1949.

From the beginning speed was of the essence. Quick calculations showed that the valve gear would follow at something over 4,000 rpm. and the rods would hold together at over 5,000 rpm. The engine appeared mechanically sound. Fast slide rule work, using some hypothetical rpm's. and b.m.e.p.'s and the liberal use of "if," gave 225 hp. certain and the possibility of 240 hp. from the engine.

A review of the qualifying speeds of the last few years and what could be learned of the horsepower used in those cars led to the belief that qualifying speed of 127 mph. could be made with the expected horsepower. The problem then, was to get the maximum possible horsepower and still hold the engine together. It was necessary to reduce the weight by about 600 pounds and to get the resulting engine into a chassis. A quick call to Kurtis-Kraft in California indicated that a car could be made available, so a rough outline drawing was sent to them and they quickly determined that, with the addition of 4 in. to the wheel base of their chassis, the engine could be mounted.

The development of the engine was then started; the date was early January, 1950. The first step was to set up the standard dynamometer engine with the belt driven supercharger, the same as used on a heavy-duty engine. The governor and over-speed stop were removed. The stops were removed from the fuel system so that practically unlimited fuel could be poured in. Short runs were made to determine the immediate horsepower gained and the limiting speed without regard for engine life. The first run gave a maximum horsepower of 187 at 2,700 rpm., and was then run at 4,000 rpm. for 1½ minutes. While this was a brief endurance run, it did show that the connect-

. . . and now please turn to page 72 . . .

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **HAMISH FERGUSON**

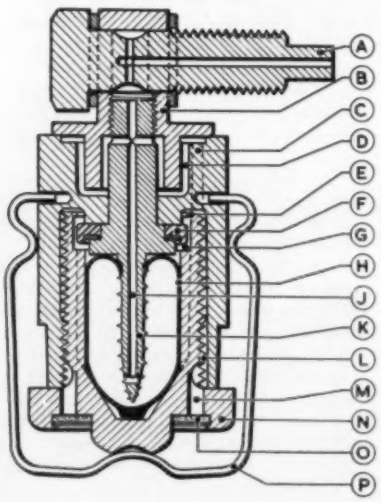
Hamish Ferguson was appointed Secretary to the Diesel Engine Users Association in London in 1944. Previously senior technical assistant to Diesel and Insurance Consultants, London, and for several years with English Electric Company in the designing and erection of large diesel generating plants. Mr Ferguson continues to do independent consulting work.

COLD STARTING OF DIESEL ENGINES

THE starting of diesel engines at low ambient temperatures involves not only the type of engine combustion system, the type of fuel and the method of injection, but also the supply of air, the method of cranking, and engine lubrication. The cranking of the engine depends on the starter, the capacity of the battery, and the torque required to overcome internal resistance of the engine. While battery design has been improved to give good low temperature performance, there are obvious limits to the size of battery which can be used in practice, and therefore to the duration and speed of cranking. The power required may be reduced by the use of low viscosity oils, but the speed of cranking must be sufficient to insure firing and running.

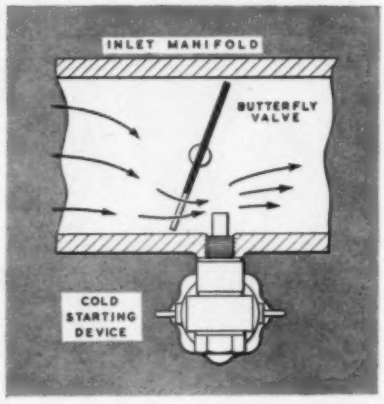
Before the last war, a starting temperature of 32°F (0°C) was considered sufficient for general test needs. This was later reduced to 20°F (−6°C), and again to 0°F (−18°C) as the result of the exceptionally cold winters emphasized by the need for operating army vehicles, etc., at these unusually low temperatures. For equipment intended for Russia, test temperatures down to −40°F (−40°C) were used.

Fig. 1. Section of C. A. V. cold starting device. Overall height 3¼ inches.



To start a direct injection oil engine at 0°F without special aid necessitates cranking speeds of up to as high as 280 rpm. Such speeds are impossible to obtain under these starting conditions, and it is therefore necessary to consider other aids, including heating and the use of ignition-promoting agents. Heating methods include the heating of the inlet air, a method which makes too heavy demands on the battery, and the use of a heater plus fuel spray, which requires careful manipulation. The use of an ignition-promoting agent offers by far the greatest scope as an aid to cold starting. Experimental work has shown that diethyl ether, introduced into the intake air, offers by far the most effective aid to ignition for the cold starting of diesel engines. Used successfully in the services during the war, the method has now been adopted for commercial use by C.A.V. Ltd. The C.A.V. cold starting device embodies two fundamental features, insuring reliable starts and economy of ether: (a) A rich ether-air mixture is provided during the first stage of cranking, to obtain the first ignition. (b) After ignition has occurred, the rate of supply of ether must be controlled to give a weak mixture to enable the engine to run to heat the combustion chamber quickly for running on normal fuel oil. The design combines the metering features with suitable capacity and extreme simplicity. It has few parts, no fine jets or holes, and is practically foolproof. The device is only 3¼ in. high. It is intended for starting diesel engined tractors, vehicles, contractors' plant or other equipment which may be left outdoors or operated in very low temperatures. The outlet connection is inserted in the inlet manifold, in way of the pitot passage of the pneumatic governor butterfly. (Where a mechanical governor is fitted, a butterfly must be fitted for the operation of the device.)

Fig. 2. Sketch showing butterfly and outlet of cold starting device in induction manifold.



	Engine Number				
Unassisted	*1*	*2*	*3*	*4*	*5*
(a) Minimum starting temperature	10°F	20°F	20°F	20°F	20°F
(b) Cranking speed	127 rpm.	96 rpm.	147 rpm.	140 rpm.	110 rpm.
(c) Starting time	30 secs.	41 secs.	24 secs.	50 secs.	25 secs.
With cold starting device					
(d) Starting time at temp. (a)	2 secs.	2 secs.	4 secs.	2 secs.	2 secs.
(e) Minimum starting temperature	−10°F	−10°F	unknown	0°F	−20°F
(f) Cranking speed at temp. (e)	87 rpm.	100 rpm.	unknown	108 rpm.	80 rpm.
(g) Starting time at temp. (e)	3½ secs.	5 secs.	unknown	2 secs.	6 secs.

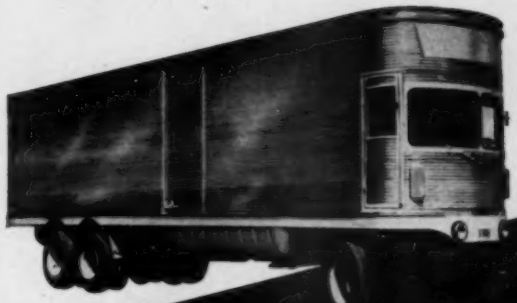
Fig. 3. Inserting the capsule into the bowl of the C. A. V. cold starting device.

The starting fluid is contained in a simple capsule of plastic material, which is simple to handle, cheap and convenient for storage. There is no loss by evaporation and no fluid is wasted by spilling. The fluid contains a proportion of lubricant.

To start, the bowl of the device (N) Fig. 1, is unscrewed, the old capsule removed and a new one dropped in (H). The bowl is then screwed up into position and secured by the spring clip (P). The capsule is pierced by the center prong (K) as the bowl is screwed up. As the rim of the bowl (E) reaches the flexible washer or collar (F) the bowl is closed and ether is forced up the center hole (J) into the annular space (D). As the rim passes the flexible collar, the bowl is again opened to atmospheric pressure, and finally the lower joint face is sealed.

On the first cranking of the engine, a very rich ether mixture is drawn into the manifold from the annular space (D), enabling the engine to fire immediately. As the engine gathers speed, the depression in the manifold increases. The first few strokes exhaust the ether in the annulus, after which the remaining supply is drawn up through passage (J); this mixes with air drawn in through filter (O) by way of holes (M), slot in the thread (L), and holes (C) to the space (D), providing a weaker mixture which is sufficient to assist ignition until normal, unassisted running on fuel oil only is established. The operator cannot interfere with the starting sequence or the amount of fluid used. As soon as the engine is running, the accelerator may be operated normally.

The table to the left shows clearly the value of the device with five typical engines, including direct injection and indirect types. In each case the starting time is reduced to a few seconds.



Fageol Twin Coach self-propelled Super Freighter is powered by 210 h.p. engine (gasoline or propane) equipped with Diamond Timing Drive.

On The New Fageol Twin Coach Super Freighters and Buses

One of new Propane Twin Motor Coaches. Engine operates at 10 to 1 compression ratios on high octane propane. Has Diamond Timing Drive.

The Engine Timing Drives are DIAMOND ROLLER CHAINS

TRADE ◇ MARK

The Fageol-designed engine (covering removed) is mounted under trailer or bus body.

• Among the important developments offered recently are the Super Freighters and the Propane Twin Coaches. On both the big freighter and the coach, the Fageol-designed engines are slung midships and operate on gasoline or propane.

On the over 6000 Fageol engines in heavy duty service today, Diamond Timing Drives have given further proof of their long-life efficiency and dependability. Diamond Roller Chains assure this reliability of performance on all kinds of engine applications—timing, accessory, auxiliary and take-off drives.

DIAMOND CHAIN COMPANY, Inc.

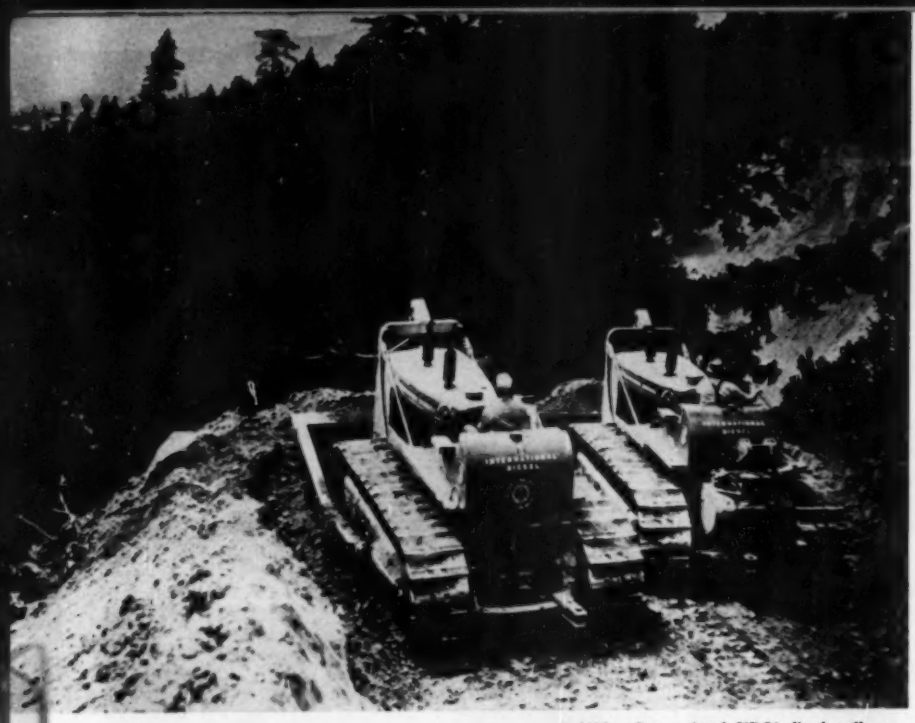
Dept. 407, 402 Kentucky Avenue, Indianapolis 7, Indiana

DIESELS SUPPLY WESTERN RAILROADS

By W. L. BODE

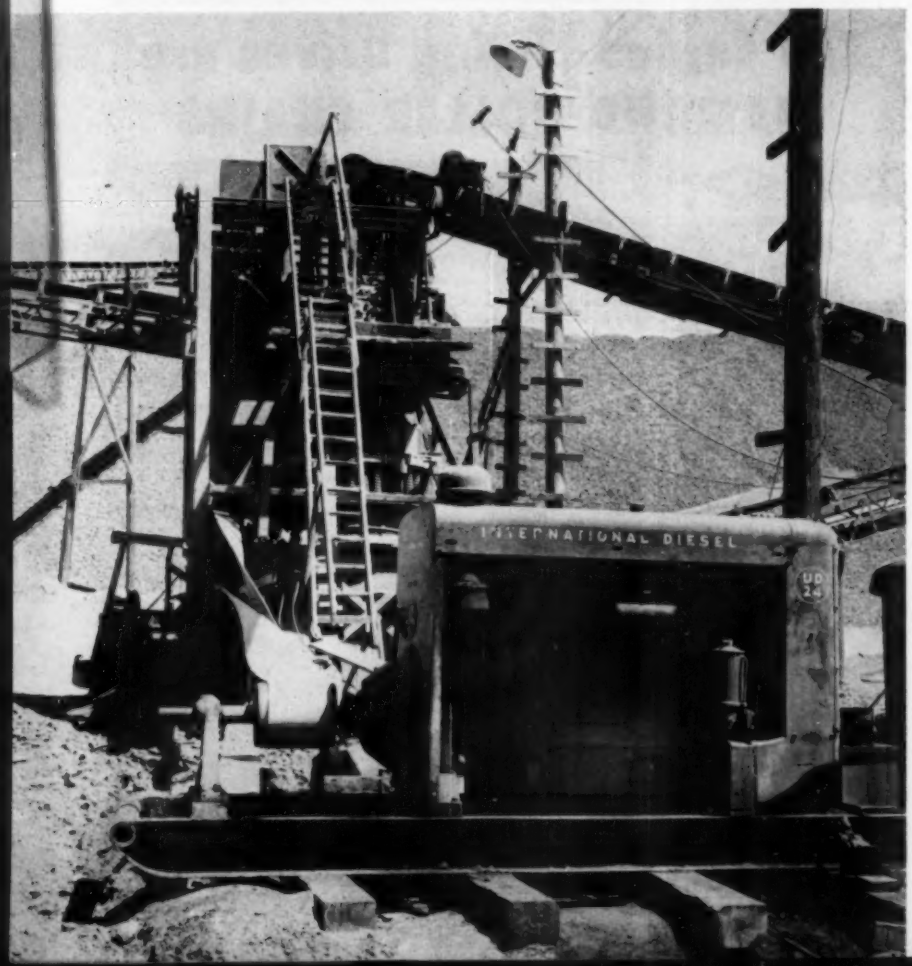
THE rapidly increasing use of diesel motive power by American railroads has been noted by almost everyone. But the extent of dieselization in other phases of railroad operation and supply has not been documented. In addition to diesel-powered off-track railroad maintenance equipment, many jobs supporting our vast railroad network are performed by diesel engines. An example is the rock-crushing plant of H. F. Green and Company in Spokane, Washington. This crushing plant supplies rock ballast to the Great Northern Railway. One of three large ballast plants supplying railroads, the Green operation has a daily capacity of one thousand yards. The rock is taken from a local basalt outcropping which is 130 feet thick. This material, when reduced to specified size, forms a perfect ballast material which is difficult to find in the area. The rock ballast is furnished in 2-inch or ¾-inch sizes, and screened material in ¼-inch or smaller size is supplied for covering station yards, drives and crossings.

Another dieselized job is that of the Russell & Gillett Company near Cle Elum, Washington. This coal-stripping operation furnishes coal to the Missouri Pacific Railroad. The vein of coal being removed is an average of 4½ feet thick, and up to 75 feet of clay and rock overburden must be removed to reach it. The average depth of overburden stripped is 30 feet, and it is bulldozed off by two huge International TD-24 diesel crawlers.



Two International TD-24 crawlers, working side by side, strip overburden at the Russell & Gillett Company coal mine at Cle Elum, Washington. Coal is used by the Missouri Pacific Railroad.

A 180-hp. International UD-24 diesel pulls a Symonds 4-inch cone crusher for the H. F. Green and Company plant, producing rock ballast for the Great Northern Railway at Spokane. This engine has operated 7,000 hours with no loss of power and low oil consumption and will get its first overhaul at 10,000 hours.



Operating at 3,500-foot altitude, two 148 drawbar hp. International TD-24 diesel crawlers strip up to 75 feet of clay and rock overburden to reach a 4½-foot-thick vein of coal.

New Raw Material Source

Power for the magnet in the recovery operation is furnished by a 10-kw. generator driven by the crane's 3-cylinder GM diesel engine.

The search for new deposits of raw materials being conducted by American steel companies has led to a review of local sources of supply not previously considered. One such source was found in grass covered hills of slag near Coatesville, Pa. These hills contain waste and quantities of scrap skimmed from cooking metal in nearby mills over the last half century. The scrap metal is being recovered by modern dieselized equipment of the same type used in the heavy construction industry. One of the five slag hills in the vicinity being worked by Brown Brothers Construction Company, Inc., of Coatesville, is estimated to contain 6,000,000 cubic yards. As much as 5,500 tons of scrap iron has been recovered in a single month. In this operation, the company virtually picks up the slag hill and sets it down again after recovering the metal. The hill is first dug into by a Kochring 1½ yard shovel which loads the slag onto busy Kochring "Dumptors." Their loads are dumped at a higher level a quarter of a mile away. At this point a Lorain Crane equipped with a magnet separates the scrap from the slag. The scrap is hauled to the mill and the operation is completed when an Allis Chalmers tractor levels off the residue. All the equipment in this recovery operation is powered by GM diesels.

Special Assistant

Albert G. Crockett

Albert G. Crockett, executive of the Mack Motor Truck Corporation, has been named special assistant to H. W. Dodge, executive vice-president of the corporation. Mr. Crockett was previously manager of the company's distributor sales organization in the U. S., Canada and Mexico. Familiar throughout the truck world as lecturer and speaker on transportation subjects, Mr. Crockett is particularly well known for his early wartime "keep 'em rolling" national tours sponsored by Mack in cooperation with ODT and the late Joseph B. Eastman. Following a three-year period of service as an officer in the U. S. Navy, Mr. Crockett renewed direct contact with truckers as director and lecturer for Mack's national diesel caravan and its more recent diesel training courses. Mr. Crockett's headquarters will remain in Mack's general offices, Empire State Building, New York City.

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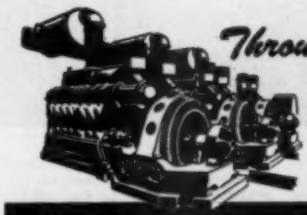
There is a competent Aerofin heat-transfer engineer near you, qualified by intensive training and long experience to find the *right* answer to your own particular heat-exchange problem.

This specialized knowledge is there, ready for you to use to your greatest advantage. Ask the Aerofin man — and be right.



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Midwest Sales Manager

A. William Fraser

A. William Fraser, formerly general European manager of Worthington Pump and Machinery Corporation, has been appointed midwest sales manager according to W. H. Feldman, vice-president in charge of sales for Worthington. Mr. Fraser will direct the sales of Chicago, St. Paul, Kansas City and St. Louis offices, making his headquarters in Chicago. After graduating from Northeastern University with a degree of Bachelor of Mechanical Engineering, he joined Worthington training course in 1929 and became sales engineer in various Worthington offices and plants throughout the country. In 1937 he became Chicago district manager and in 1945 general European manager.

Illustrated Bulletin

A new 28-page, two-color bulletin has been issued by the Nordberg Manufacturing Company, Milwaukee 7, Wisconsin. Fully illustrated with installation and product photographs, Bulletin 187 gives design data on Nordberg two and four-cycle stationary and marine diesels, gasoline marine engines, Symons Cone Crushers and Screens, mine hoists, machinery for the basic procesing of ores and mine rails, air and gas compressors, and railway track maintenance equipment. Bulletin 187 is available on request to the Company.

New Chromium Chemical Plant

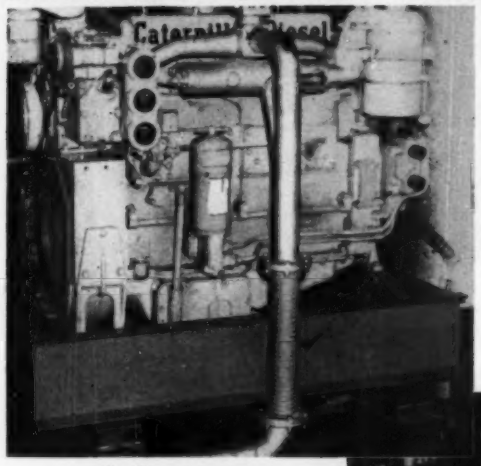
Mutual Chemical Company of America has announced the completion of a new chromium chemical plant to increase the production of sodium bichromate and other essential chromium compounds. The new plant is located on the Baltimore harbor adjoining facilities constructed previously and is the largest and most modern chromium chemical plant in the world. With these additional facilities at Baltimore, Mutual's productive capacity is substantially increased. Operations have already commenced in the new plant and are expected to reach progressively higher levels over the next few months. The demand for chromium chemicals has been exceptionally heavy, and, partly as a result of extended soda ash strikes in 1950, output of the industry has not been able to meet all demands. New capacity coming into production now is therefore particularly timely and will be most helpful in assuring adequate supplies of chromium chemicals.

Appointed NPA Consultant

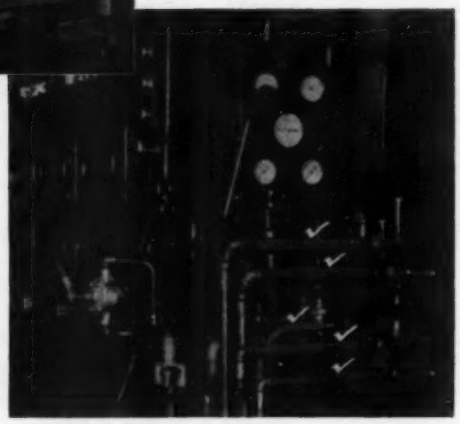
M. B. Garber

Marshall M. Smith, director of the Machinery Division of the National Production Authority, Washington, D. C., has announced that M. B. Garber, director of sales for the Thew Shovel Co., Lorain, Ohio, has been sworn in for services as an on-call consultant. Mr. Garber will continue his duties at Thew but will be available as an on-call advisor on NPA matters pertaining to the requirement, use and production of construction machinery. In accepting this assignment, Mr. Garber returns to the scenes of his activities during World War II when, on loan to the government by Thew, he served as director of the Construction Machinery Division of WPB.

Eliminate the "Shakes" in . . .



✓ Exhaust Lines
✓ Oil Lines
✓ Fuel Lines
✓ Water Lines
✓ Air Lines



with CMH REX-WELD Flexible Metal Hose

There's no need to worry about the shakes in fixed piping connected to internal combustion engines if you use CMH REX-WELD Flexible Metal Hose assemblies. They effectively absorb vibration in exhaust, fuel, air, oil and water lines. By isolating vibration, maintenance is reduced, shutdowns minimized. Installation misalignment problems are solved, too.

CMH Rex-Weld is all-metal, corrugated flexible metal hose that is pressure and vacuum tight and highly resistant to fatigue. Rex-Weld Flexible Exhaust Connectors are available in all required sizes with choice of fitting attachments. Rex-Weld Flexible Metal Hose for fuel, air, oil and water is available in bronze or steel with couplings to meet your needs.

Write for data sheets today and ask about other CMH Flexible Metal Hose Types.

Flexon identifies CMH products that have served industry for over 48 years

CHICAGO METAL HOSE Corporation

1325 S. Third Avenue • Maywood, Illinois • Plants at Maywood, Elgin and Rock Falls, Ill.
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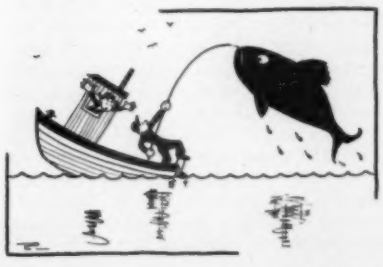
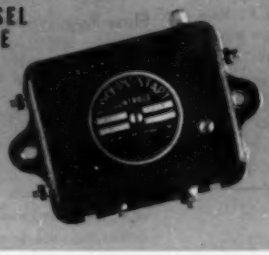
CMH **ONE DEPENDABLE SOURCE**
for every flexible metal hose requirement



Automatic
CRANKING CONTROLS
FOR DIESEL
GASOLINE
OR GAS
ENGINES



For small engines where price is a factor, our Model KI is an AUTOMATIC start and stop control containing interrupted cranking and a time limit for cranking. There is a connection for a signal to warn in case engine fails to start. Many thousands of these controls are in use on refrigeration units, and for small engines that must be portable for radio, telephone, and other emergency services.

SYNCHRO-START PRODUCTS
INCORPORATED
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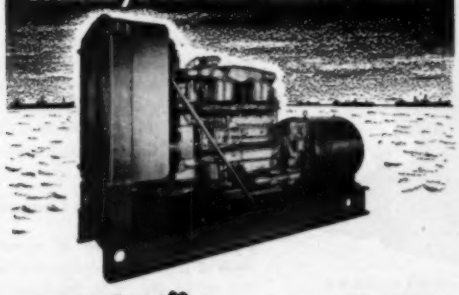
Standbys for the Tanker Fleet!



Reiner DIESEL GENERATORS

16 of the Reiner 60 KW Reiner Diesel generators shown above are serving as standby units on a fleet of gasoline and oil tankers built by a large eastern shipyard for one of the major oil companies.

Reiner equipment gets the call wherever efficiency, economy and dependability are essential. Whatever your power needs—generators, pumps or compressors—portable, stationary or marine—diesels, gas or gasoline driven—Reiner can meet your requirements, with either standard or custom built units. It will pay you to check with Reiner engineers today. There's no obligation.

Free bulletins on standard units sent on request. Write today stating your requirements.

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LONG ISLAND CITY 1, N. Y.
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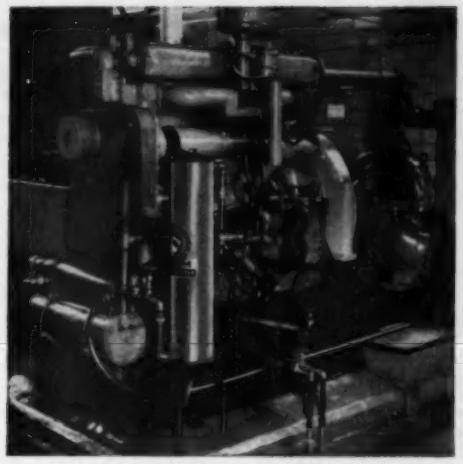

Fram Filter Installation on Murphy Diesel at New London, Conn., Waterworks

FRAM Filters Assure Dependable Diesel Operation at Pumping Station

PUMPING STATION Supervisor Walter F. Mahoney says words cannot express the excellency of Fram Filters. This station operates 24 hours a day, 7 days a week, pumping water from reservoir into large storage tanks which supply New London, Conn., with water. Reliable operation is vital. Without it, the city would be without water. Fram Filters remove sludge, grit, abrasives and other impurities from lubricating oil, prolong engine life, cut down-time and maintenance costs.

FRAM Filcron Filters Do the Job Better!

- *Remove solid and abrasive contaminants 1 micron (.000039") and larger*
- *Minimize Engine Wear*
- *Reduce Engine "Down-time"*
- *Extend Engine Life*
- *Lower Operating Costs*

No matter what your Diesel oil filtering problem—either lube or fuel—Fram can help you conquer it. Write for full information today to:

FRAM CORPORATION, Providence 16, R. I.
In Canada: J. C. Adams Co., Ltd., Toronto, Ontario.

FRAM *Filcron*
THE MODERN OIL FILTER

Allis-Chalmers Names President

William A. Roberts

William A. Roberts, executive vice president in charge of tractor division, Allis-Chalmers Manufacturing Company since 1947, has been elected president of the company at a special meeting of the board of directors. Mr. Roberts succeeds the late Walter Geist who served as president from 1942 until his death from a heart ailment on January 29. The board of directors also made several organizational changes.

Oil City Works Sale Completed

Sale of the plant and equipment of National Transit Pump and Machine Corporation, Oil City, Pa., has been completed and Worthington Pump and Machinery Corporation has taken possession of its facilities. The miscellaneous overflow from Worthington's other factories will be diverted to the Oil City plant according to Austin C. Ross, vice president in charge of Worthington's Buffalo plant, who will also have administrative charge of the plant. William F. Weinreich, formerly assistant superintendent of Worthington's Buffalo machine shops, will be in charge at Oil City as assistant to the vice president. The former Transit plant which covers 500,000 square feet, includes iron, steel and brass foundry, pattern shop and forge shop, machine shops and assembly floor, test facilities, power house, steel fabricating shop and administration building. Worthington plans to furnish repair and spare parts for the products of National Transit Pump and Machine Company now in the field.

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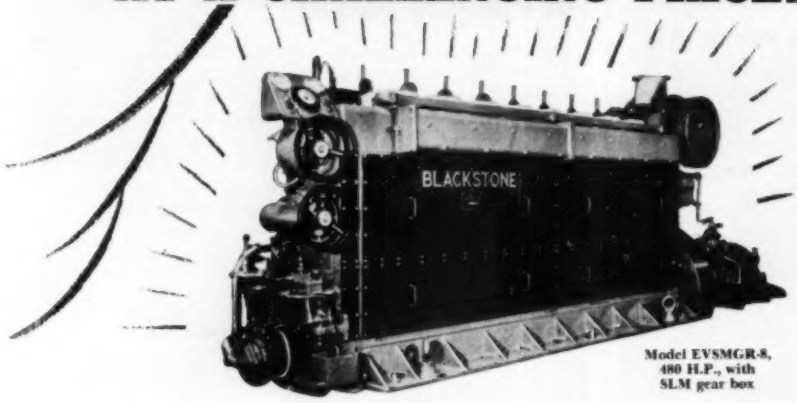
Announces . . .
AN ACHIEVEMENT OF —

THOROUGHBRED POWER AT A CHALLENGING PRICE!



Model EVSMGR-8, 480 H.P., with SLM gear box

The New 'EV' Series

145 H.P. — 480 H.P.

★ Prompt Deliveries

★ Dependable Nation-Wide Lister-Blackstone Service

Available in industrial and marine models. Three, four, five, six and eight cylinders. Super-charging on four, six and eight cylinder models.

Marine engines have separate, oil-operated SLM gear box.

Write for information outlining your requirements.

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Factory, Sales & Service Headquarters: 420 Lexington Avenue, New York 17, N. Y.

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Sold and Serviced in 37 Countries Throughout the World

Flow-Regulating Valve

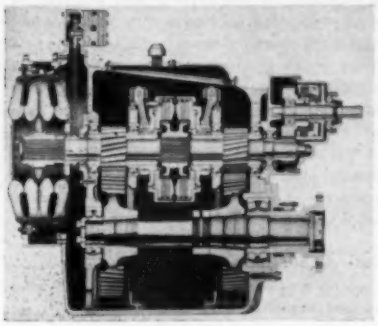
The Reynolds Shaffer Co., Detroit 4, Michigan, announces the new Reynolds Flow-Regulating Valve. According to the manufacturer, this new valve is a de luxe stop cock for use where an exact setting of the regulated water or other liquids is required. It can be used as a flow-regulating valve for jet pumps and spray pumps, as a by-pass valve on boiler feed lines, and wherever a quick-opening, easily operated regulating valve or stop cock is needed. The Reynolds valve is guaranteed (due to "O ring" packing) not to leak externally. Exceptionally close fitting (Bearenized finish of plug and I.D. of plug hole)) permits only the slightest internal weeping. Despite the extremely close fit, the plug turns easily for accurate manual adjustment. The valve features "finger-tip operation, one-quarter turn opening and closing (full ported, or with ¼-inch opening), all-brass construction and the positive "O ring" packing which will withstand almost any pressure and will not leak. For the ¾-inch pipe size, the valve is 2½-inches long and comes in two different type plugs; the R-V #1, full ported with an area of 1-inch pipe in port; and R-V #2, with ¼-inch port for fine adjustments. This may be used in place of needle valves and similar fine adjustments. The valve will be produced in larger sizes for special applications if desired. For a detailed bulletin giving complete information and specifications, write to DIESEL PROGRESS, File No. 80, P.O. Box 8458, Cole Station, Los Angeles 46, California.

Information on Air Compressor Drives

Up-to-date information on motor drives for all types of large air compressors is supplied in issue No. 32 of the "E-M Synchronizer." Mr. G. L. Oscarson, chief application engineer of the Electric Machinery Mfg. Company gives authoritative application information and selection data on both motors and controls for a variety of compressor types and sizes. The two-color 24-page bulletin is fully illustrated and contains tables, charts, and graphs for matching motor characteristics to compressor requirements. Also contained in this issue is a technical discussion of "Pr," "Synchronizing Power," and the various methods of motor and control protection for compressor installations. The bulletin is available from the Electric Machinery Mfg. Company, Minneapolis 13, Minn.

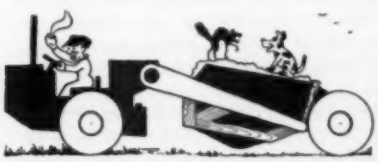
DIESEL ENGINE CATALOG is now available in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 89.

Hydraulic Coupling Marine Gear



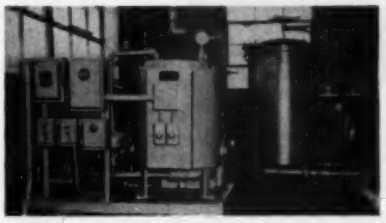
A new hydraulic coupling marine gear with optional Hydro-Troll Drive for engines in the 300-350 hp. class has been announced by the Twin Disc Clutch Company of Racine, Wisconsin. The new unit, the Model MGH-340, has hydraulically actuated clutches in addition to a fluid coupling drive. Like the recently introduced Model MGH-220 marine gear for engines in the 90-230 hp. range, it brings the smoothness and noise-free operation of hydraulic couplings to engines in its class. Embodying space saving design and torsional vibration dampening features, the gear is available with or without the new Twin Disc Hydro-Troll feature which has heretofore been available only in the lower horsepower range. The new gear is available with either a 21-in. or 27-in. hydraulic coupling. The MGH-340 with 21-in. hydraulic coupling can be equipped with a new slow speed Hydro-Troll drive which, at low trolling boat speeds, permits the engine to turn in an efficient range to prevent engine fouling and maintain a satisfactory battery charging rate. This control was previously available only on the smaller hydraulic drives with 14-in. and 17-in. size couplings. The control of the coupling fill is actuated by a manually operated valve which permits increasing slip from "normal" 3 per cent to as much as 30 per cent. This increased slip in effect multiplies the mechanical reduction to the propeller by as much as one and one-half times. Thus, a 3:1 marine gear will reduce propeller speed as much as 4.5:1, or from an engine speed of 900 to a propeller speed of 200. At the touch of the valve, full speed, full power operation is instantly returned with complete coupling fill and normal reduction.

The development of a new, quieter, more compact, hydraulically actuated marine reverse and reduction gears in 175 and 300-hp. sizes has also been announced by the Twin Disc Company. Incorporating new design principles, the new gears, models MG-175 and MG-302, transmit engine torque through rubber in compression to cushion the drive. New design makes the gears extremely compact. (20 inches overall with rubber block for the MG-175 and 40 inches for the MG-302.)



Hoffman I-718-18 cartridge filters provide continuous filtration of lube oil for this and other diesel engines on the Mid-Valley Pipeline. Cover-lifting device and swing-bolts speed removal of head for replacement of "throw-away" cellulose cartridges.

Lube Oil Clarity for Pump Station Diesels of Mid-Valley Pipe Line Protected by HOFFMAN Filters



Reclamation of lube oil to "like-new" standards is accomplished by Mid-Valley stations with Hoffman Model I-18-10 Vaporizers. Soluble impurities (such as light ends and water) are removed continuously by thermostatically controlled heating of the oil under high vacuum.

For the gas-diesel and straight diesel engines of Mid-Valley's pumping stations, nine Hoffman cartridge filters and three Hoffman vaporizers maintain lubricating oil with these advantages: The cartridge filters, directly connected to the engines and standby oil pumps, provide continuous purification of the lubricating oil.

Hoffman's exclusive cover lifting device and simplified swing-bolt assembly speed replacement of 7" x 18" cartridges. As an adjunct, the Hoffman Vaporizer removes solubles, at high flow rates, without the high maintenance cost of centrifuges. Write for technical bulletin.

FREE Filtration Engineering Service

For the right answer to your filtering problems, a Hoffman filtration engineer will survey your needs — make recommendations based on detailed analysis of solutions, oils and other factors. Ask for this service — there is no obligation.

FILTRATION ENGINEERING SERVICE... For the right answer to your filtering problems, a Hoffman filtration engineer will survey your requirements and furnish recommendations based on detailed analysis of all factors. Ask for this service—There is no obligation.

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UNITED STATES HOFFMAN MACHINERY CORPORATION
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CANADIAN PLANT: CANADIAN HOFFMAN MACHINERY CO., LTD., NEWMARKET, ONT.

Research With a Sporting Flavor

... *Continued from Page 63* ...

ing rods would hold together at these speeds, the valve gear would function, and that there was a serious limitation on breathing with the 2-valve head. The engine was rebuilt, giving the pistons more clearance and with revisions to use an old 4-valve head saved from the earlier experiments. This build-up ran somewhat longer than the first because the pistons no longer seized. However, the rod bearings again failed and the front main bearing failed, due to the belt pull from the supercharger drive. There was, however, an immediate gain of approximately 40 hp. with the 4-valve head. The engine was again built up with changes to eliminate these failures and with this set-up the engine held together. With the supercharger and valve arrangement at that time, it appeared that the best breathing and horsepower could be had at 3,600 rpm., so this speed was used for all development. The program primarily settled down to cumbustion study. This involved changing piston crown shape, injector spray hole size and angle, compression ratio and injection timing.

To get some idea of durability an endurance run was made in the laboratory. A cycle of operation was figured out which closely approximated the cycle of engine operation on the 2½-mile track at Indianapolis. The engine was set at 300 hp. and the speed varied between 2,800 rpm. and 3,600 rpm. with the throttle. An acceleration period of 10 seconds was used and a deceleration period of 20 seconds. The dynamometer load was kept on at all times. After the engine proved that it could survive this rough treatment for six hours, the next phase of the program—reduction of weight—was considered. The experimental wooden patterns made for cast iron were put in the pattern shop and all fillets and corners filled liberally with wax so that aluminum castings could be taken from this equipment. The aluminum engine ran well and many of the expected mechanical difficulties failed to materialize.

Since the aluminum version of the engine developed no serious mechanical troubles, this engine was put through the same six-hour endurance cycle as its cast iron predecessor and came through successfully. The engine was now ready for installation in the chassis and actual running on the race track. On May 1 the car was put on the track and ran for the first time. Jimmy Jackson, a veteran of the Speedway, was at the helm. The car, carrying the numeral 61, was painted green — and promptly dubbed by track followers "The Green Hornet."

Development, however, had not stopped with the taking of the car to the track. A second engine was on the test block in the laboratory and refinements and changes giving small increases in output were being made. This program was to pay big dividends as we shall see later. In the meantime, on the Indianapolis track, all the work necessary to fit the car, engine, gear ratios, and driver to the track was being carried out and experience necessitated many changes and additional experimentations. Prior to the race the car was run over 365 practice laps or 925 miles at high speeds.

After the opening day of qualifications it became apparent that the horizons as to speed were going to have to be elevated. Actually qualification speeds increased from an average of 128.361 in 1949 to 131.045 in 1950 and the "hot" pace necessitated again revising horsepower estimates upward. This is where continued research in the laboratory on the second engine paid off.

Improvements had been made on the second engine in the Research Laboratory and it was now producing 320 hp. at 4,000 rpm. with an exhaust smoke level about like a standard, new NHS-600 Cummins Diesel at 275 hp. at 2,100 rpm. However, due to the air "scoop" to the supercharger on the front of the car a "ramming" effect was obtained which permitted the engine to run on the track with an absolutely clean exhaust with the test block fuel setting of 320 hp. Calculations show that this improvement in combustion obtained from the additional air resulted in an additional 20 to 25 hp., or a total engine output of 340 to 345 hp. with clean exhaust. This additional horsepower appeared necessary if the Cummins entry was to find a place in the starting field. Therefore, the laboratory engine, with all latest improvements and with the horsepower settings outlined above, was installed during the week of May 22.

Jimmy Jackson qualified the car on Saturday, May 26, with one day of qualification time remaining, at a speed of 129.208 mph. Qualification consists

This VAPOR PHASE equipped engine has now broken all existing performance records

WENT INTO SERVICE JULY 1939 • NOW, FEB. 1, 1951, RECORDS SHOW:

100,279 HOURS IN 11½ YEARS
(ON UNTREATED ACID FUEL)
Repair Costs to date $478.69

In a truck, driven at a speed of 30 m.p.h., this would equal a total of 3,008,370 miles!

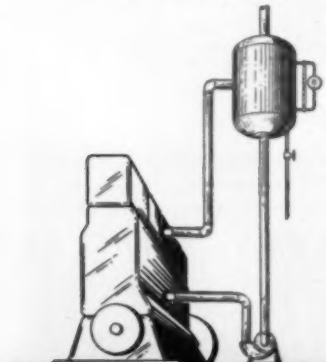
All *original* Cylinders, Pistons, and Inlet Valves *still in service!*

That is today's incredible performance record of the VAPOR PHASE equipped 40-H.P. Enterprise 1000 R.P.M. Engine operating on *ordinarily harmful raw sewage gas fuel* in the Visalia, California Sewage Plant.

And equally amazing is the fact that, back in '39, this engine replaced an identical conventional system engine (*without Vapor Phase*) that had broken down completely after only 5 months' service. *Acid type fuel did it!*

Visalia knows that under such tough conditions, such engine efficiency and operating economy would be impossible *without* VAPOR PHASE. So now, in this same plant three more 80-H.P. VAPOR PHASE equipped engines are now in operation.

This world's record VAPOR PHASE performance is not uncommon. It is just that this is one of the *first* VAPOR PHASE units, serving under the most rugged conditions.



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Regardless of engine size or type—Diesel, Gasoline or Gas—regardless of fuel used, load requirements, altitude or ambient temperatures—anything from sub-frigid to burning desert—VAPOR PHASE converts your conventional cooled engine into a long-life super-efficient power unit. And saves you almost unbelievable operation costs!

AND THAT'S NOT ALL!

Vapor Phase equipped engines *also* serve the multi-purpose job of generating steam, heating water, fluids, space or other process (including cooling or heating through air conditioning systems)—each as required or all at the same time for the cost of engine operation *only*.

VAPOR PHASE pays off in Savings alone, the first year. The unit costs nothing to operate and is good for life.

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of a time run of 4 laps or 10 miles and the 33 cars with the highest qualifying speed start the race on Memorial Day. One other car subsequently qualified at a lower speed than the Diesel Special, thus, completing a field of 33 on Saturday. This put the Cummins entry 32 in a field of 33 and if the two cars were to qualify later at speeds in excess of 129.208 the diesel would be "bumped" from the race.

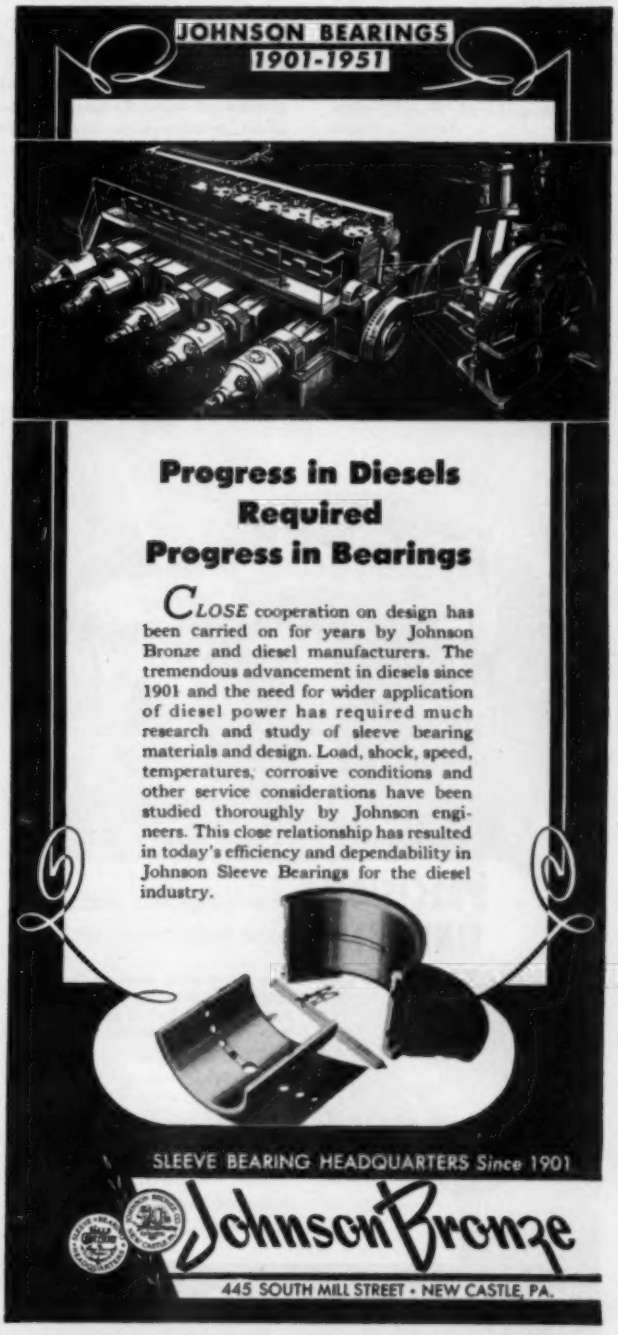
On Sunday, the final day of qualification, 21 cars were ready, and 21 attempted to qualify. However, all failed except one and at the closing of the track Sunday the green Cummins Diesel Special was assured a place in the starting lineup on May 30.

The actual race is history. The car was driven a planned race from the start. Jimmy Jackson, the driver, hit a fairly slow pace at the start of about 110 mph. At the end of 10 laps he began upping his speed to about 117 mph. The car ran smoothly, and Jackson moved up to 119 mph. with a few laps at 120 mph. Still running smoothly Jackson began his next planned upward movement. An average of 121-plus had been expected, but on the 52nd lap Jackson was forced into the pits and inspection revealed the mounting flange of the torsional vibration damper proper had broken, allowing the outside ring of the damper to land on the drive-shaft of the supercharger. Without the effect of the damper it was considered too dangerous to continue the race even if the ring could have been removed and therefore the car was moved to the garage.

While the engine closely resembles the basic "JS" truck engine, it is no sense a commercial engine in weight, speed, or horsepower. To summarize:

1. The commercial version of the Model JS-600 engine has already benefited by the research work and will further benefit in the future. 2. The horsepower output of a commercial truck diesel was more than doubled for the race car application through four and one-half months of intensive research and development work. 3. The weight of a commercial truck engine was reduced by 45% for the race car application at the same time the horsepower was being more than doubled. 4, Standard commercial fuel oils, presently available, appear to be satisfactory for operation at much higher speeds and higher engine output. 5. Little deviation from standard timing and settings appear necessary in order to operate at higher engine speeds. For example, the standard, commercial timing also proved best at speeds of 4,000 rpm., thus assuring that no automatic, external injection timing retarding or advancing mechanism would be necessary for operation at higher speeds. 6. Finally it is now well know how to attain acceptable combustion at much higher engine speeds at little or no loss in economy.

And thus Cummins Engine Company, Inc., telescoped into a few short months, engineering research and development equal to years of normal activity by courageously setting a high target and submitting the product of slide rule and laboratory to trial by speed. The trends toward ever


JOHNSON BEARINGS
1901-1951
Progress in Diesels
Required
Progress in Bearings
CLOSE cooperation on design has been carried on for years by Johnson Bronze and diesel manufacturers. The tremendous advancement in diesels since 1901 and the need for wider application of diesel power has required much research and study of sleeve bearing materials and design. Load, shock, speed, temperatures, corrosive conditions and other service considerations have been studied thoroughly by Johnson engineers. This close relationship has resulted in today's efficiency and dependability in Johnson Sleeve Bearings for the diesel industry.
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higher engine operating speeds and horsepower ratings, which in most cases have moved forward in small increments has again been given a sudden boost by this pioneer in the high speed diesel field.

In September this same car established these records in two tries at Bonneville:

Distance	Cummins Record	Former Record
1 mile	165.23	158.87
5 miles	161.92	112.07
10 miles	148.14	.....
1 kilometer	163.83	159.10
5 kilometers	164.25	126.99
10 kilometers	147.63	.....

Young Radiator Licenses Canadian Firm

Certain selected types of heat transfer products of Young Radiator Company, Racine, Wisconsin and Mattoon, Illinois, are now being manufactured in Canada under special license arrangements granted James B. Carter, Ltd., Winnipeg. The announcement was made jointly by Fred M. Young, president of Young Radiator Company and J. B. Carter, president of the Canadian firm. James B. Carter, Ltd. has been granted manufacturing privileges to certain Young designs and engineering specifications and will produce heat transfer units exclusively for the Canadian market. Established in 1920, the firm also manufactures a large line of replacement radiators and heaters of its own design. According to Mr. Young, units manufactured by the Carter organization are identical with those being made in Young's Racine, Wisconsin and Mattoon, Illinois factories. The new arrangement is expected to provide a substantial saving to Canadian customers in transport costs.

Builds Model Manufacturing Plant

Because of increasing demand for automatically controlled engines and in compliance with governmental recommendations for decentralization of critical industries, Synchro-Start Products, Inc. has built a new factory at 8151 North Ridgeway Avenue in Skokie, Illinois. Located 10 miles north and five miles west of Chicago's Loop, it is located near residential areas, supply centers and is serviced by four convenient transportation lines. The one story, ultra-modern building houses the executive and general offices and final assembly. Fabrication will remain in other plants until additional units can be built. For the comfort and health of Synchro-Start employees, air-conditioning has been installed together with an automatic oil-fired radiant floor heating system. Showers and dressing rooms are provided and selected commercial and recorded music is brought into the working area through well placed speakers. The communication system throughout the entire building consists of their usual telephone system with recording facilities, inter-communication, P.A., and sound-scriber systems, plus a 1,000 watt short wave radio station, W9EPF. Many new and modern construction features have been utilized in the fireproof building. Re-enforced concrete foundations are "earth formed" below ground level, steel and masonry walls and partitions, the outside walls being veneered in bands of two-tone brick trimmed with Indiana limestone and glass block. A reinforced, poured flat roof lays on the top of the ceiling I-beams, and fire walls separate the different factory and office zones.

PRECISION FINISHING
interchangeable parts—
lower maintenance costs
Even the heaviest parts of every FULTON DIESEL are craftsman-machined to such close tolerances that they are completely interchangeable. Result:
• Smoother running—higher operating efficiency
• Greater fuel economy—less wear and tear
• Quick, easy replacement saves time and money
WHERE DEPENDABILITY COUNTS, YOU CAN COUNT ON FULTON
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Aids in Competitive Selling

Every diesel salesman should have as a part of his working kit a copy of the DIESEL ENGINE CATALOG because this book contains a detailed description of every diesel engine made and sold in these United States. No matter what competition you run into, you can turn to this book and find the answer. Ask yourself why 121 Fairbanks, Morse salesmen carry this book in their cars; why 22 General Motors field men use this book as standard equipment, so to speak; why 27 of Worthington's top diesel salesmen use this book most every day. If you haven't got your copy of DIESEL ENGINE CATALOG, Volume 15, send a check for $10.00 to DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46, California, and the book will be on its way the next day.

Train to Train Radio Communication

Two way train radio on Missouri Pacific Lines permits instant communication between engineer and conductor in caboose, or with other engineers on trains within operating range of the radio.

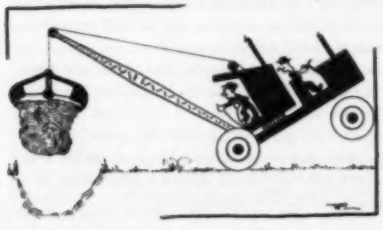
Every dieselized locomotive, passenger and freight, on the Missouri Pacific System will be equipped for train to train radio communication. This was assured when U. S. District Judge George H. Moore authorized an expenditure of $324,250 to install radio-telephones on 137 diesel locomotives and 102 cabooses now in service. In addition, 75 locomotives on order will similarly be equipped and 100 diesel freight units have been or are now being radio-equiped. When all are in service by next summer, Missouri Pacific Lines will have a total of 312 diesel locomotives and 285 cabooses radio-equipped. When the installation is complete, the railroad estimates that more than 75 per cent of its total passenger mileage and more than 80 per cent of its main line passenger train mileage will be dieselized and equipped with radios. Radio will be standard equipment on all diesel locomotives to be purchased by them in the future.

Dieselized Aircraft

Taylorcraft, Inc., builders of light airplanes, has been granted exclusive rights by Diesel Power, Inc., holders of patent inventions, to install and use light airplane diesels up to 500 horsepower. The patent holding company claims that an airplane so powered will have the advantages of greater power, less and cheaper fuel consumption, freedom from smoke, quicker take-off, 40 percent higher flying range and less danger of fire in case of crashing. Taylorcraft is the first in the airplane industry to secure such a license. Development work will begin immediately at the Taylorcraft plant, Conway, Pa.

New Agent Named

The Hilliard Corporation, Elmira, New York, manufacturers of Hilco Lube, Fuel and Industrial oil, filters, reclaimers and purifiers, has announced the appointment of the Betz Engineering Sales Company, 1225 Magazine Street, New Orleans 13, Louisiana, as a new representative. The Betz engineering Sales Company will cover the territory of Louisiana, Mississippi, and southern Arkansas. They will act as agents for the full line of Hilliard-Hilco lubricating, filters, reclaimers and purifiers.



Joint Vehicle Production

A big step in the growth of western heavy industry and a major contribution to western defense efforts was announced jointly by the Mack Manufacturing Corporation and the Wooldridge Manufacturing Company of Sunnyvale, California. Under an agreement signed by both organizations, the Wooldridge Company will partially produce and fully assemble Mack off-highway vehicles in their main Sunnyvale plant. The vehicles, which operate off the public highways, will be specially designed to fit the needs of western contractors, miners and loggers. The joint activity brings together the experiences and skills of two firms noted for the manufacture of heavy rubber-tired equipment. Wooldridge is widely known for its Terra Cobras and other contracting and earth moving equipment. The Wooldridge Manufacturing Company will also act as exclusive distributor for Mack's off-highway equipment in ten western states. Plans are being rushed for the construction of a $250,000 modern assembly plant.

New Diesels for Missouri Pacific

The first lot of diesel locomotives in Missouri Pacific Lines' order for 124 units was received by them last month. When total delivery has been made, during the latter part of the year, the Missouri Pacific System will have 553 diesel locomotive units in operation.

Choose from the complete Alnor Line
for the Thermocouple Performance You Need
For every diesel—from the largest Power Plant to the smallest auxiliary—there is an Alnor thermocouple specially designed to give consistently dependable service. These exceptionally rugged couples have proved in years of top performance that they can give precision operation under all conditions . . . in all applications. In fact they have been specified by every major engine manufacturer as original equipment.
Choose the type and style you need—in a wide price range. Take advantage of the Alnor design, which assures non-rust, waterproof, dustproof and corrosion-resistant performance. Send for information on the rigid types, featuring easily detachable stem and "no thread" conduit connections—an Alnor exclusive. Or if your thermocouple problem calls for a flexible, detachable style, ask about the flexible Alnor types with non-rusting cables that will not crack or break under the roughest handling.
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Illinois Testing Laboratories, Inc. Room 508, 420 N. La Salle Street, Chicago 10, Illinois
Alnor
PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Thirty-Eight Diesel-Electric Locomotives Booked

Orders for thirty-eight diesel-electric locomotives, having a total valuation of approximately five million dollars have been booked by Baldwin-Lima-Hamilton Corporation within recent weeks. Included in this total are fifteen 1600 hp. All-Service locomotives for the Reading Company; two 1600 hp. All-Service and four 1200 hp. switching locomotives for the Chicago & North Western Railway; eight 800 hp. and one 1200 hp. switchers for Sharon Steel Corporation. The remaining orders cover 1200 hp. switching locomotives and comprise one for the Akron & Barberton Belt Railroad, four for the Kansas City Southern Railway, two for the Wabash Railroad, and one for the Calumet & Hecla Consolidated Copper Company.

Launched Recently

The towboat *Vesta*, first of two identical craft built by the Dravo Corporation for the Jones & Laughlin Steel Corporation, was recently launched. The towboat, one of the same class being built by the shipyard for the Pittsburgh district river coal traffic, was christened the *Vesta* in honor of one of the steel company's mines, by Mrs. Paul Tietjen, wife of J. & L.'s director of water transportation. Her aide at the launching was Mrs. A. T. Wood. Driven by two 533 hp. Superior diesel engines, the boat will push six barges loaded with 5400 tons of coal between J. & L.'s mines and steel mills. A radar system that permits navigation of the vessel through fog is included in the modern equipment on the *Vesta*. *The Shannopin*, sister ship of the *Vesta*, is scheduled for launching shortly.

CONTROL POWER BETTER
8 out of 9
Major Farm Tractor Manufacturers Use
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To Help Make Their Tractors Operate Reliably and Efficiently in the Most Rugged Service
Let our engineers show you how ROCKFORD CLUTCHES will help make your product stand up under the stress of heavy duty work.
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ROCKFORD CLUTCHES

Thirty Years With Texaco

Herbert W. Schilling

Herbert W. Schilling, assistant to the manager of the Marine Sales Division of The Texas Company, marked thirty years representing Texaco with the shipping industry. Starting with the company in 1916, Mr. Schilling became Marine salesman in the New York division in 1920. In June, 1940, he was advanced to the position of Marine representative and transferred to the general domestic sales department and in 1944 was promoted to his present position, as assistant to J. G. van Santvoord, manager of the Marine Sales Division. In this thirty years association with the shipping industry he has made a host of friends in maritime circles not only in New York, but all along the Atlantic and Gulf coasts. He is a member of the Propeller Club, Rudder Club and Downtown Athletic Club.

Special Device

Pushing 21-ton concrete pipe sections around is no trick at all when using the diesel tractor equipped with a special device owned by the Hawaiian Dredging Co., Honolulu, T.H. Pipe sections as big as 84 inches in diameter are shoved about by a unique pushing arrangement which consists of hard rubber rollers applied to a bulldozer blade. At the present time the Hawaiian firm is working on the San Island Sewer Outfall job. It uses a Caterpillar D2 Tractor with the roller device to push the heavy concrete pipe sections to the wharf where they are loaded aboard a small barge to be towed out to the dredging site.

Complete Sales, Service Facilities

Tom La Vorene

City Industrial Engine Sales, Inc. has opened its complete sales, service and parts distributor facilities on Chrysler and International gas and diesel industrial engines at 2259 S. Indiana Avenue, Chicago, Ill. Tom La Vorene, who has had 15 years of industrial engine experience, is vice-president and general manager. George Clarke is service manager. Harry Groessman heads up the parts department. The new company which was established by Tom La Vorene late last fall, has an ideal 10,000 sq. ft. one-story building on the northeast corner of Indiana Avenue and 23rd Street in the heart of Chicago's motor row. The business is devoted exclusively to industrial engines and parts, power units and allied items as used by the construction field and industry. The company is reported to have on hand the largest distributor's stock of Chrysler and International engines in the Illinois and Indiana territory, with a big, highly systemized parts department and shop equipped with the latest and best in tools, repair, overhauling and complete rebuilding machinery. Mr. La Vorene advises that a staff of "the best engine men in captivity" will cover Illinois and Indiana. Dealers located at key points throughout the two states will augment the sales and service facilities of the Chicago headquarters. The company will sell no construction machinery, having been organized to meet the need in the territory for a house of industrial engine specialists. The large volume of orders and work on hand precludes any opportunity for a formal opening. Visitors, however, are welcome.

Manager

Orren S. Leslie

Orren S. Leslie, formerly with the Electro-Motive Division of General Motors, has assumed the duties of manager of the Beloit, Wisconsin works of Fairbanks, Morse & Co. He replaces Henry M. Haase. Mr. Leslie had been connected with General Motors for twenty-two years, in the Pontiac, Cleveland Diesel and Electro-Motive Divisions. He attended and subsequently held a post on the faculty of the General Motors Institute.

DIESEL ENGINE CATALOG is now available in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 89.

Stationary Tachometer Described

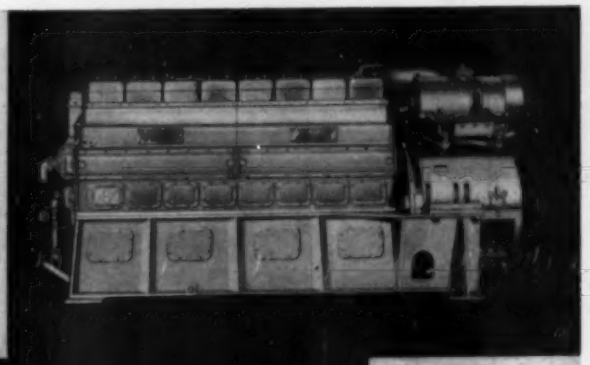
A new bulletin issued by the Herman H. Sticht Company, Inc., 27 Park Place, New York City, describes the latest addition to the Sticht line of stationary tachometers. This stationary tachometer, Model J-6, is designed for permanent mounting on machines or panels. The tachometer has a large face, 5½ inches in diameter, and is of the centrifugal type driven by flexible cable. The instrument can be furnished in standard ranges from 10-100 rpm. as a minimum to 1,000-10,000 rpm. as a maximum. Bulletin No. 794 describing the Model J-6 stationary tachometer can be obtained by writing the company at its New York City office.

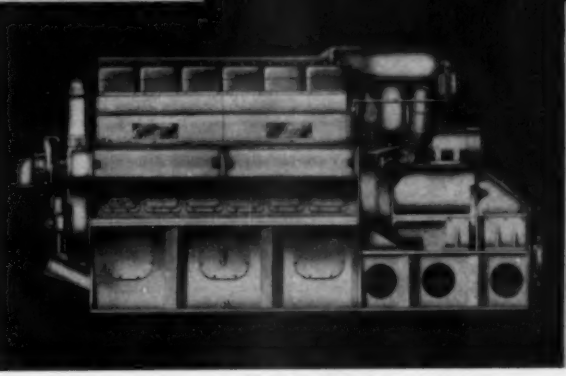
Appointed Works Manager

E. Waldemar Sjoquist

R. H. Olson, president of Electric Machinery Mfg. Co., Minneapolis 13, Minn. has announced the appointment of E. Waldemar Sjoquist as works manager. Mr. Sjoquist has been associated with the company since 1925 as chief mechanical engineer and since 1948 as consulting engineer. He replaces Carl C. Nelson who has resigned as vice president and works manager.

50 YEARS OF EXPERIENCE AND PROGRESS





ABOVE

Sterling Viking Diesel 8 cylinder generator set rated at 600 KW.

LEFT

Sterling Viking Diesel 6 cylinder marine engine with reverse gear, rated at 665 HP in continuous service.

●

Descriptive bulletins on these and other Sterling Viking Diesel engines from 350 to 1000 BHP will be sent on request.

POWER to move ships and trains, to operate machinery or to light airports, means much more than merely installing an engine.

Fifty years of experience...broad and successful experience in applying power to just about every conceivable use is one of the reasons why Sterling engines are held in such high regard the world over.

Engineering progress is a second reason for Sterling preference. The best evidence of what constitutes success in engine design and performance is when customers come back for more.

We have the present day orders, facts and figures to show every marine and industrial user of power that Sterling's first 50 years marks just the beginning. *Talk to a Sterling Engineer.*

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Enterprise Appointment

Henry D. Bahr

Henry D. Bahr has been appointed manager of the service department of Enterprise Engine & Machinery Co., it was announced by Paul I. Birchard, vice president. Mr. Bahr was previously Enterprise's Far Eastern Service representative in the Philippines. He has been associated with the diesel industry since 1937 when he finished his diesel engineering studies at Pratt Institute, New York. During the war, he served with the War Department office of the Chief of Engineers in the Africa Middle East Theatre. There he supervised the rehabilitation of captured power plants and construction of new diesel power plants.

Melodious Locomotive Horns

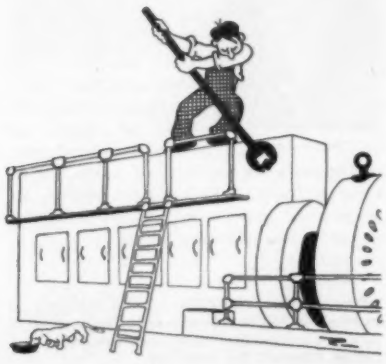
The day of the steam locomotive may be nearly over, but in the words of the song-writer, "the melody lingers on," at least on the Frisco Railway. The melody is the Airchime horn with which the new 1,500 horsepower diesels purchased by the Frisco are equipped. While early diesels apparently were more powerful, faster and cleaner than their steam predecessors, they still received considerable criticism because of their air horns. Persons residing along the tracks complained that the blasts of the diesel horns kept them awake at night instead of lulling them to sleep as did the old "lonesome wail" of the steam whistle. Some motorists said that the horns not only were unmusical but also unsafe, contending that they mistook locomotive toots for truck, bus and even boat horns. Science studied the problem and came up with an answer—a new air horn which sounds like the old steam whistle. Actually the air horn on the new Frisco diesels consists of five horns, each one sounding a different note. The combination is loud but melodious.

Training Chart Set Series

The Delco-Remy Division of General Motors has released a new Training Chart Set Series consisting of seven sections, separately bound and printed in three colors. A separate Chart Manual, containing 8½ in. x 11 in. reproductions of the charts and instructor's helps, accompanies each Chart section. Titles and prices are as follows: Fundamentals of Electricity and Magnetism, $3.00; Storage Batteries, $2.00; Cranking Motors & Series Parallel Switches, $3.00; The Ignition System, $4.00; Generators, $3.00; Standard Duty Generator Regulators, $5.00; Heavy Duty Generator Regulators, $5.00. The price of the complete set is $20.00. Sections may be purchased separately if desired. Individual manuals are available at 25c each. Copies can be ordered from the United Motors Service, 3044 West Grand Boulevard, Detroit 2, Michigan or the nearest United Motors Service outlet.

Milwaukee Manager

Patrick J. Patton has been named Milwaukee manager for the Commercial Sales Division of the De Laval Steam Turbine Company of Trenton, New Jersey. He will handle the sale of De Laval turbines, pumps and blowers in Wisconsin with headquarters at 1932 No. 117 Street, Wauwatosa, Wisconsin. Prior to joining De Laval, Mr. Patton was a regional sales supervisor for Worthington Pump and Machinery Corp.



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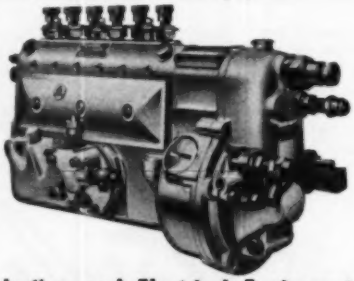
Transport operators all over the world have learnt to trust this sign.

In any language the letters on the C.A.V. sign stand for first-rate service facilities, maintained by highly-trained craftsmen, using special precision equipment.

Wherever vehicles fitted with C.A.V. Fuel Injection Equipment are exported — whether to Trondheim, Santiago, Hong-Kong or Sydney — there's a service agent or depot to give it the specialist attention needed for such high-precision equipment.



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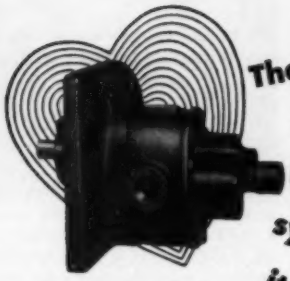

The HEART of a diesel lubricating system is its PUMP

Rotary geared pump with special flange mounting becomes integral part of diesel engine when installed. Note opening above relief valve for tachometer.

Modern diesel operation generally requires a pressure lubricating system — and the vital element is the pump. Thousands of Brown & Sharpe pumps are now providing reliable service month after month without interruption, for lubrication, transfer, or booster systems. Available with various types of flange mountings and special internal construction to meet specific requirements. Write for catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

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ATLANTIC METAL HOSE

GUARDS

DIESEL LIFELINES

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ATLANTIC flexible metal hose does a better job of controlling vibration of its own lines and mounting than conventional hose, trouble free operation because each section is *Job Tested and Guaranteed to Do Its Job!*

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DIESEL ENGINE CATALOG

The purpose of this little advertisement is to chat with you for a few moments about why YOU should have a copy of this splendid reference book available when YOU need it. For fifteen years it has been referred to as "the bible of the industry."

All of the smart diesel engine salesmen carry this book around in their car. When they run into some new competition with which they are not too familiar—the Diesel Engine Catalog gives them full, detailed information when they need it most and need the data to be accurate.

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DIESEL ENGINE CATALOG

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Don't permit damaged Crankshafts and other expensive critical parts to become a total loss. They can be economically restored to normal service by our time proven and guaranteed methods.

Many heavy and bulky parts can be repaired ON LOCATION by our especially developed machines, methods and skilled personnel — thus effecting great savings in time, dismantling and shipping costs.

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WASHINGTON IRON WORKS, INC.

SHERMAN, TEXAS

Navy Grants $20-Million Contracts For Series of Powerful Diesels

Packard Motor Car Company has announced government contracts totalling $20,000,000 for a series of powerful diesel engines and associated parts for the Navy Bureau of Ships. The Packard-designed and Packard-built engines will have six, eight, twelve and sixteen cylinders, according to Hugh J. Ferry, Packard president. It is claimed that the new engines are among the most powerful marine diesel engines per pound of weight in production. The "family" of engines has a four-cylinder unit as yet not under Navy contract. Mr. Ferry said the engines would have a wide range of application and would be used by the Navy both for propulsion and auxiliary purposes. However, specific use of the various diesel engines was withheld for security reasons.

He also said that the company was tooling-up its manufacturing facilities for early production of these new units. Packard estimated several thousand more employees eventually would be needed to meet the Navy's production schedule. Manufacturing of the engines would be in addition to any production of aircraft engines resulting from recently disclosed negotiations with the U. S. Air Force. Continuous horsepower rating of the new high output, light-weight engine "family" ranges upward from 135 hp. for the four, to 800 hp. for the sixteen-cylinder unit.

The Packard president explained that servicing of these engines will be greatly simplified because of the degree of interchangeability of parts on different models of the series as well as complete accessory assemblies. Packard research and development work on this new series began in the closing months of World War II under the Navy's far-sighted sponsorship and has been carried through to the present contracts. It was pointed out that Packard had applied aircraft engine principles to the manufacturing of these new units by using aluminum and other light-weight materials to the utmost.

RN

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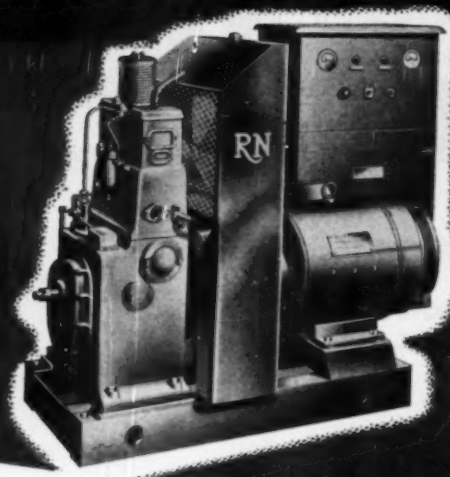

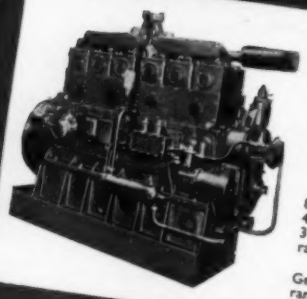

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9 models 1–6 cylinders, 5/150 h.p. at 600/1000 r.p.m.
4 models 1–4 cylinders, 13/52 h.p. at 1500 r.p.m. (B.E.S.A. ratings).
60-cycle A.C. or D.C. Generator Sets up to 95 kW.

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8 models 2–6 cylinders, 18/150 h.p. at 1000 r.p.m.
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MARINE AUXILIARY
Generator, Pump and Compressor Sets for Shipboard use—range as Industrial.

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Course Completed

Karl Jonsson, Jr., center, receives his certificate from G. B. Shandley of Stewart & Stevenson, right. At the left is Carl Dohrenburg. Other class members pictured left to right are: A. E. Justia, Barney O. Doherty, L. J. Burks, Hermenegildo Guerrero, Teodoro Munoz, Gustavo C. Cantu, Jesus Esquivel, Lucien Gambu, John Bordneau, Luis Alarcon and Rudolfo Resendez

Stewart & Stevenson Services recently completed another in its series of two-week schools in GM diesel engineering which are designed for the benefit of its customers whose personnel wish to learn more about diesel engines. A new class begins every second month at the Stewart & Stevenson plant at 4516 Harrisburg, Houston, Texas. A certificate is awarded at the end of the class.

Towns Purchase Diesels

Two large Hamilton diesel engines, one among the largest in the United States, have been reported sold by Baldwin-Lima-Hamilton Corporation, Hamilton, Ohio. The engines will be used to generate electric power in Decatur, Indiana, and Robstown, Texas. The engine for Decatur is a 12-cylinder, 2-cycle diesel with 21½-inch bore and 27½-inch stroke, having a rating of 5370 brake horsepower and 74 brake mean effective pressure at 240 revolutions per minute. It is designed for easy modification for dual-fuel operation on oil or gas if desired later. A new power plant of ultra-modern design is being built at Decatur to house the new engine. The engine will supplement the city's steam plant during peak loads for the time being and will provide emergency stand-by power. For its municipal power plant, Robstown has purchased a 6-cylinder dual-fuel diesel. This engine has a rating of 485 brake horsepower per cylinder at 257 rpm. or a total of 2900 horsepower. It provides a power increase of more than 70 percent over the total rated power the present six gas engines in use there at present.

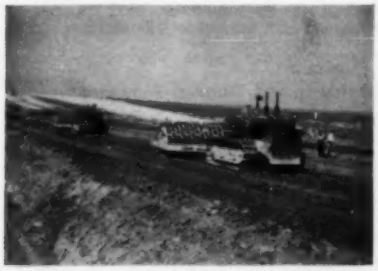
Executives Honored

Robert H. Morse, Jr., president of Fairbanks, Morse & Co., (right) presents the coveted President's Cup to Paul A. Sues, (left), manager of the company's Mexico City Branch house. Others pictured are (left to right): O. O. Lewis, Jorge Diaz Serrano and Henry J. Barbour.

Paul A. Sues, manager of Fairbanks, Morse de Mexico, S.A., was presented with the President's Cup by Robert H. Morse, Jr., president of Fairbanks, Morse & Co., Chicago manufacturers, at a recent dinner given at the Hotel del Prado in Mexico City. This was the first time the President's Cup, which is the highest award given by the company each year, has ever been bestowed outside the continental limits of the United States. Eighteen years ago Colonel Robert H. Morse, who was at that time president of the company and who is now chairman of the board and general manager, first presented a trophy to the company's branch house which enjoyed the largest volume of sales in relation to its annual quota. Since the inception of the Cup race, the trophy has traveled from coast to coast, having been won several times by the New York and San Francisco branches of the organization, and also by branches located in Cleveland, St. Paul, St. Louis, Omaha and Dallas.

It is customary that the field engineer of the branch winning the Cup have this name inscribed thereon along with the name of the manager. Consequently, this year Jorge Diaz Serrano had the honor of having his name appear on the trophy. In the absence of Colonel Morse who was not able to be present, Robert H. Morse, Jr., president of the company, did the honors. Others from Chicago headquarters office to attend were: O. O. Lewis, vice president-sales; V. H. Peterson, manager, Railroad Division; Henry J. Barbour, manager, sales promotion and public relations; and Charles F. Doepke, manager, Mexican exports department.

Earth-Fill Dam



Shown above are two of the five International TD-24's used to pull 40,000 pound tamping rollers on the immense earth-fill Falcon Dam, the biggest single project ever undertaken in the lower Rio Grande Valley. This $77 million project located 75 miles south of Laredo, at Falcon, Texas, will stimulate the development of the rich truck garden and citrus growing areas on both the Mexican and American sides of the river. The dam will be 150 feet high at the maximum fill and only 106 feet short of five miles in length. More than 30 million cubic yards of earth will be placed for the dam. Only the spillway will be of concrete construction. Contracts were let to a joint venture of seven contractors. They are C. F. Lytle, Sioux City, Iowa, prime contractor; Sam Ore Construction Co., McPherson, Kansas; Amis Construction Co., Oklahoma City; Foley Bros. Inc., St. Paul, Minnesota; Massman Construction Co., Kansas City; Tellepsen Construction Co., Houston, Texas; and F. G. Peterson Co., Omaha.

Actual work began in January, 1951. Philip Royer is general superintendent in charge of the project. Primary purpose of the structure will be irrigation along with hydro-electric development and flood control. Seasonal high river levels are counted on to fill the 4 million acre-foot-capacity reservoir. Cost of the project is being shared by both the United States and Mexican governments and water for irrigation will be divided in proportion to the investment of each government. Completion of the dam is scheduled for 1953.

DIESEL ENGINE CATALOG is now available in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 89.

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HYDRAULIC VALVE LIFTERS

—automatically maintain zero clearance in the valve train at all times

Zero-Lash opens the door to:

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- Perfect tappet adjustment for the life of the engine under all engine operating speeds and temperatures.
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Eaton engineers welcome the opportunity to discuss application of its multiplicity of hydraulic valve lifter designs to engines proposed or now in design.

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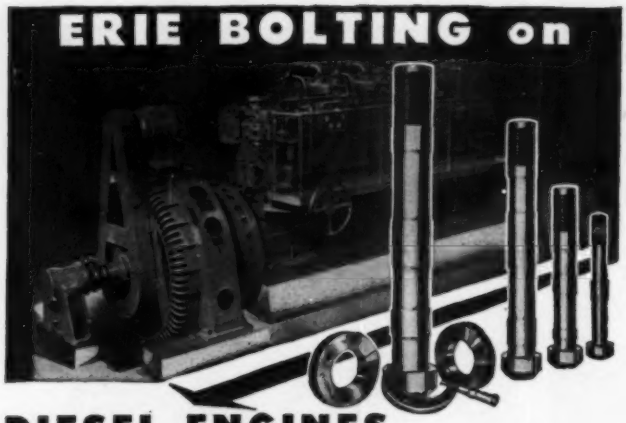

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For over 30 years ERIE has manufactured bolts and studs to the specifications of Diesel Engine builders. This specialized experience gained in working with leading Diesel designing engineers assures you of getting the exact materials and the precise tolerance in bolting desired for your Diesel. Send us your specifications for Diesel Connecting Rod Bolts, Cylinder Head Studs, and other special bolting. Write for new price and data book.

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Check These Features

- Test Pump 1800 cu/mm capacity; ported design. Leak-proof—plunger is chrome steel, hardened, ground and lapped into pump body.
- Nozzle-holding Fixture has spring clamps that accommodate nozzles of different shank diameters. Nozzle is simply "snapped" into position between the clamps.
- Fuel Supply Reservoir (2.5 pint capacity) of durable, transparent plastic; fuel level can be easily observed.
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Fairbanks, Morse Appointment

C. H. Morse, Jr.

V. H. Peterson, manager of the Railroad Division, Fairbanks, Morse & Co., Chicago, has announced the appointment of C. H. Morse, Jr., as manager of the Locomotive Service Department, effective with April 1st, 1951. He succeeds J. E. Justus who retired as of that date after completing twenty-five years of employment with the company. Mr. Justus will, however, devote part time on a special assignment basis and will have the title of special assistant to the manager of the Railroad Division. "Chuck" Morse, as he is known to many of his friends, has for the past eighteen months served as assistant manager of the Locomotive Service Department and also more recently as district manager of Locomotive Sales in the Chicago district. His headquarters will be in the Chicago office, 600 South Michigan Avenue, Chicago 5, Illinois, the Fairbanks-Morse Building.

Fuel Pump Accepted By UL

Acceptance of the recently developed Cummins DD (double-disc) fuel pump by the Underwriters' Laboratories, Inc. has been reported by the Cummins Engine Company, Inc., of Columbus, Indiana. Tests of the pump were recently completed by Underwriters' representatives at the factory and approval was given by the fire insurance agency for the use of the DD fuel pump with Cummins Underwriters' Approved Fire Pump Engines. The three engines previously approved by Underwriters' are the 125 hp. Model HI-600-F, the 150 hp. Model NHI-600-F and the 205 hp. Model NHIS-600-F. These Cummins diesels are used in stationary fire pump applications where Underwriters' approved equipment is specified. The DD fuel pump is standard on the NHIS-600-F engine and optional on the HI-600-F and NHI-600-F diesels. The DD fuel pump is 65 percent lighter in weight and 55 percent smaller in size than the single disc fuel pump. Because of its size, the new pump facilitates installation and maintenance and further reduces the overall weight of the engine. Reciprocating parts are lighter in weight on the pump which contributes to greater service life. The design largely eliminates angular stress on governor and throttle linkage which in turn reduces wear on bearings and bushing.

President and General Manager

Robert H. Owens has been elected president and general manager of Roots-Connersville Blower Corporation, succeeding John Avery who died unexpectedly early this year. Mr. Owens, a graduate of Purdue University, came to Connersville in 1925 to join the engineering staff of the P. H. & F. M. Roots Co., a predecessor of Roots-Connersville. He was actively connected with the development of the centrifugal line of blowers built by R-C. Roots-Connersville Blower Corp. is a subsidiary of the Dresser Industries, Inc., whose headquarters are in Dallas, Texas.

Oil and Gas Power Conference

The twenty-third Annual Conference and Exhibit of the Oil and Gas Power Division of ASME will be held in the Baker Hotel, Dallas, Texas June 25-29. Arrangements have been completed for a technical program of unusual interest to operators of diesel, dual fuel and gas engines. Special provisions have also been made for inspection trips to two of the largest internal combustion engine installations in the world at Point Comfort and Corpus Christi, Texas. The exhibits to be presented by various engine and accessory manufacturers will be interesting and educational. The Diesel Engine Manufacturers Association (D.E.M.A.) is collaborating with the Oil and Gas Power Division to build a conference that will amply reward all who attend. Because a large attendance is expected it is suggested that reservations be made early. The Baker Hotel has blocked off rooms and will honor reservations for this meeting while they last.

TENTATIVE PROGRAM, 23rd Oil and Gas Power Conference and Exhibit. Monday, June 25, 8:30 A.M., Registration; 10:30 A.M., Technical Session—"Effect of Charge Temperature and Pressure upon the Rating of Diesel Engines," by Ralph Miller, Chief Engineer, 4-cycle Division, Nordberg Manufacturing Co. 12:30 P.M., Welcome Luncheon. 2:00 P.M., Technical Session: "Damage Prevention from Crankcase Explosions," by Albert C. Cavileer, U.S. Naval Engineering Experiment Station. "Crankcase Explosion" by G. W. Ferguson and Bryan Corrigan, The Texas Company.

Tuesday, June 26: 7:45 A.M., D.E.M.A. Educational Program Breakfast (by invitation). 9:30 A.M., Special Lectures; 11:45 A.M., Exhibitors Social Hour; 2:00 P.M., Special Lectures; 8:00 P.M., Meeting of the General Technical Committee (open to all).

Wednesday, June 27: 7:45 A.M., D.E.M.A. Chief Engineer's Breakfast; 9:30 A.M., Panel—"Engine Operation and Maintenance - Operator's Viewpoint." Moderator—Harry L. Kent, Jr., Associate Professor of Mechanical Engineering, University of Texas. 2:00 P.M., Panel—"Engine Operation and Maintenance—Manufacturer's Viewpoint." Moderator, George Steven, Executive Engineer, Worthington Pump and Machinery Corp. 5:30 P.M., Exhibitors' Social Hour. 7:00 P.M., O.G.P. Annual Banquet (open to all).

Thursday, June 28: 9:30 A.M., Technical Session —"Modern Gas Engines" by Ralph L. Boyer, V.P. and Chief Engineer and W. R. Crooks, Resident Engineer, Cooper-Bessemer Corp.—also "Operation of a Direct Connected Engine Driven Compressor as a Gas Generator" by J. N. MacKendrick, V.P.; George Bollman, Project Engineer, and C. A. Chamberlain, Project Engineer, Clark Bros. Co. Inc.; 11:45 A.M., Exhibitors' Social Hour; 2:00 P.M., Technical Session—"Design of Exhaust Snubber for Gas Engines" by R. L. Leadbetter, V.P. Burgess-Manning Co.;also "Performance and Operation of Water Cooling Equipment," by Howard E. Degler, Technical Director, The Marley Co.

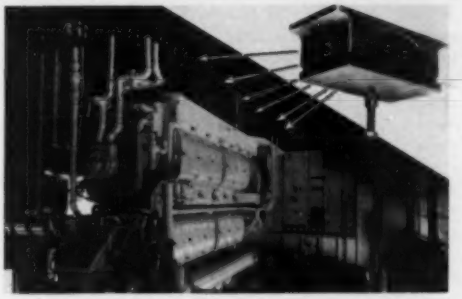
Friday, June 29: Inspection Trip by specially arranged flights to Aluminum Co. of America at Point Comfort and Haliburton Cement Co. at Corpus Christi.

DIESELS for operating **ECONOMY**

The present day trend toward diesels — both for new installations and for replacements — is largely due to operating economy and dependability.

Current installation practice is to mount them on Korfund Vibro-Isolators.

This makes it possible to install diesels anywhere with positive assurance that there will be absolutely no transmission of objectionable vibration. Additional benefits include savings from reduction of building and engine maintenance costs, and frequently the elimination of concrete foundations.



This Alco 975 hp. six cylinder turbocharged main generating unit installed on a mooring barge operated by U.S. Army Corps of Engineers, Memphis District, supplies power for their new dragline bank graders. The unit is mounted on Korfund vibro-isolators for smooth operation, and to prevent bearing misalignment due to hull distortion.

Vibration is absorbed by steel springs which provide the finest isolating medium available. Thrusts are controlled by resilient chocks in the four corners.

The result is smoothed, floating operation at all speeds — in marine, mobile, or stationary installations. The cost is low. Ask for Bulletin G-102. Representatives in principal cities.

A Few Typical Installations:

Bangor Hydro-Electric Co., Bangor, Me.....6 1425-hp. Nordberg
Lenox Hill Hospital, New York.....1 750-hp. Worthington
2 Park Avenue, New York.....4 450-hp.; 1 750-hp. Worthington
New Yorker Hotel, New York.....1 530-hp.; 1 750-hp. Busch-Sulzer
Namm Department Store, Brooklyn
4 300-hp.; 1 180-hp.; 1 150-hp. Worthington
Macy's, New York.....1 700-hp. Alco
Floyd Bennett Field, New York.....1 450-hp. Fairbanks-Morse
Prudential Insurance Co., Newark, N. J.....1 740-hp. Baldwin
Lone Star Gas Co., Dallas, Texas.....1 400-hp. Cooper-Bessemer (Gas)
Sun Oil Co., Marcus Hook, Pa.....4 350-hp. Ingersoll-Rand (Gas)
Cia Central Argentina De Electricidad, Buenos Aires, S. A.
1 270-hp. Sulzer; 2 540-hp.; 1 540-hp.; 1 700-hp. Deutz

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KORFUND for operating **SMOOTHNESS**

TITUSVILLE *Diesel* **CRANKSHAFTS**

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Precision Tolerances and Finishes as your Requirements demand . . . Turn to Titusville for Engineering and Research Counsel—an organization of master Craftsmen with facilities second to none in the industry.

Struthers Wells

STRUTHERS WELLS CORP. *Titusville Forge Division*
TITUSVILLE, PENNA.

Aeroquip Buys Metalco, Inc.

Aeroquip Corporation of Jackson, Michigan, has purchased al lthe outstanding stock of Metalco, Inc., also of Jackson. Metalco has been a substantial subcontractor of Aeroquip, furnishing a variety of special hose fittings, tube bends and elbows used in Aeroquip Hose assemblies. Operation of the newly acquired company will be continued as a wholly owned subsidiary of Aeroquip with Don Mortlock as vice-president and general manager. Kenneth Meyerholtz, chief production engineer and plant superintendent of Aeroquip, has been elected president of Metalco. Fred Corwin, secretary of the purchasing company, is secretary-treasurer. This wholly owned subsidiary's board of directors consists of Peter F. Hurst, Kenneth Meyerholtz and Fred W. Corwin.

Metalco has been operating in Jackson in a plant which appears inadequate to handle the increased production requirements. Arrangements for the lease of a larger plant, located in Cheboygan, Michigan, have been concluded. This plant will more than triple the floor space of Metalco and allow a sizeable expansion of its operations.

Vice Presidents Elected

W. L. Manning, president of the Burgess-Manning Co., manufacturers of industrial noise abatement equipment, announced the election of Dudley W. Day and C. P. Certik as company vice presidents. The new officers were elected at a meeting of the board of directors. Mr. Day, who has been director of marketing, was recently named manager of the company's newly formed Architectural Products Division. Mr. Certik, formerly director of procurement and manufacturing, was recently named manager of the Libertyville and Ashippun division where activities are concentrated on locomotives and industrial products.

Costs Cut With Selenium Rectifier Welders

The 2 million gallon capacity City of Niagara Falls water tower and the single-engine driven eight selenium rectifier welders used in its construction. The entire unit weighs 62 percent less than eight separate units and represents an initial savings in cost of equipment of about 50 percent.

Diesel fuel savings of 70 percent and maintenance savings of 85 percent resulted from the use of selenium rectifier welders during the erection of a 2 million gallon water tower for the City of Niagara Falls, New York, by the Pittsburgh-Des Moines Steel Company. Fuel savings were made possible by the use of one diesel-driven generator to supply power for eight Westinghouse selenium rectifier welders. Formerly, eight separate engine-driven welding generators were used. Maintenance required on the single diesel engine was approximately the same as that required on each of the eight units previously used.

The diesel engine used to drive the generator supplying power to the eight selenium rectifier welders required 33 gallons of fuel per day. At 10 cents per gallon, the daily fuel costs ran $3.30. Previously, each of the single engine-driven welding generators required 15 gallons of fuel per day. For eight machines, a total of 120 gallons was required, or $12.00 per day for fuel. These savings are partly attributable to low standby power required by the selenium rectifier machines since less fuel is consumed during idle time. In this erection job, the welding duty cycle was relatively low. The equipment used represented a saving in initial cost of approximately 50 percent. Formerly, eight 35-hp. diesel-driven welding generators of capacities equal to the selenium rectifier machines were used. The eight latter, Westinghouse type RA 400-ampere selenium rectifier machines, plus a 60-kw. generator are driven by a 115 hp. diesel engine. The single engine-driven generator and machines weigh approximately 62 percent less than the eight separately powered welders. This resulted in a

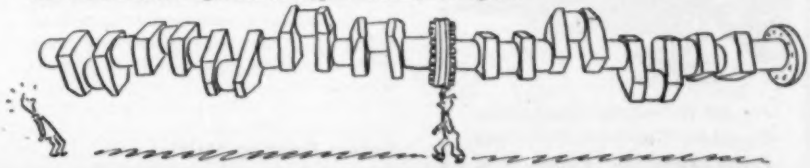
considerable savings in handling and shipping. The water tower on which this equipment was applied is a radial cone bottom—eliptical roof top type water tank. It is 139-feet high and 101 feet in diameter, and is supported by sixteen 44-inch tubular columns. The 748 tons of steel used in the tank's construction was butt-welded, using approximately eight tons of welding rod.

300,000 Miles Without Overhaul

Operation of a NHB-600 Cummins diesel truck for over 300,000 miles without an overhaul is described in a four page bulletin released by Cummins. The truck, owned by General Petroleum Corporation, operated between Los Angeles and Phoenix. General Petroleum is quoted as stating that five factors were responsible for the long life of the engine. 1. A well planned and consistent lubrication program. 2. Operation by well trained and experienced drivers. 3. Conscientious adherence to a well planned protective maintenance program. 4. Evenly spaced gear ratios resulting in a minimum amount of engine lugging. 5. Use of high quality fuel and lubricant. The bulletin, which describes care of the engine during operations and its condition when torn down, is available from the Cummins Diesel Engine Company, Inc., Columbus, Ohio or any Cummins dealer.

DIESEL ENGINE CATALOG is now available in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 89.

Enterprise Engine & Machinery Co. again chose the Sonoma Mission Inn, California, as the site for their annual sales meeting, where members of the national sales organization joined the home office personnel for a three-day session early this year. Seated, left to right: J. E. Watson, general sales manager; W. E. Clayton, Jr., secretary; J. W. Coombs, member board of directors; W. E. Butts, president; P. I. Birchard, vice president and general manager; H. T. Anderson, district manager, New York; G. B. Wright, representative, Chicago; G. C. Raney, sales manager, engine division. Second row: P. B. Erwin, district manager, Los Angeles; L. J. Robbins, district manager, St. Louis; W. H. Porter, district manager, Seattle; T. S. White, technical engineer; H. G. Bahr, manager, service department; J. M. Maag, representative, Kansas City; K. F. Cramer, representative, Kansas City; D. S. Briese, advertising manager; H. J. Dauphinee, export sales; H. F. Neuman, stationary sales. Back row: G. J. Brusher, marine sales; H. H. Goodwin, sales engineer, New York; P. K. Wabnig, district manager, New Orleans; W. E. Bishop, representative, Washington, D. C.; J. E. Barthmaier, district manager, Boston; M. T. Prendergast, manager, parts department; W. Malone, sales engineer, Chicago; H. L. Hansen, chief service engineer; T. S. Pennebaker, district manager, Fort Worth; J. H. Sheusner, chief engineer.



Honan-Crane Cuts Diesel Overhaul 50%
A report from Lindsborg, Kansas Municipal Power Station says—
"Since installation of Honan-Crane purifiers, improvement in the condition of oil and in engine cleanliness has been so marked that city engineers plan to pull pistons only once every two years instead of every year as has been their custom."
ONLY A HONAN-CRANE OIL PURIFIER GIVES YOU THIS KIND OF PROTECTION
Write today for complete information
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A SUBSIDIARY OF
HOUDAILLE-HERSHEY CORP.
Honan-Crane purifier using Cranite (specially processed Fuller's earth) continuously serves the 1200 HP. Model 38FD Fairbanks, Morse dual fuel unit at Lindsborg, Kansas Municipal Power Station

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MEASURES and RECORDS EXPLOSION, GAS or HYDRAULIC PRESSURE

For Jet or Internal Combustion Engines, Compressors, Pipe Lines, Injection Pumps and Explosions

Completely Re-Engineered, the new Linear Stabilized Pressuregraph now provides greater accuracy in measuring and recording pressure-time studies of dynamic, static and transient pressure phenomena.

In addition to its wide range (from a few ounces to 10,000 PSI) and broad frequency response (static or zero to over 20,000 CPS) it now offers these new exclusive features:

Linear measurement
Drift stabilized
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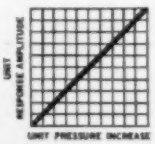
200,000 separate pressure measurements per second.
Up to 200' of pick-up cable can be used.
Greatly simplified adjustments on pick-up



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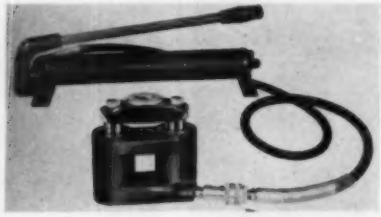
Power-Twin Hydraulic Puller



A new lightweight hydraulic puller announced by the Owatonna Tool Company, Owatonna, Minnesota, weighs less than ten pounds and develops fifteen tons of power. This OTC Power-Twin has a center hole which makes it quickly and conveniently adaptable to all OTC pulling systems now in use. Because of the center hole and the twin cylinders, this device gets at jobs ordinarily inaccessible with a hydraulic ram. It is 5½-inches high and works in any position. The ram travels two inches which is adequate for 95 percent of all pulling jobs. Another bite takes care of the balance. The remote control pump develops 10,000 psi. Six feet of high pressure hose allows the operator to stand a safe distance from the work. Wire guards protect the hose and special non-leak couplers are tested for 24,000 pounds. Complete information and catalog may be obtained from jobbers or Owatonna Tool Company, 415 Cedar Street, Owatonna, Minnesota.

Surface Finishing Machine

Storm-Vulcan, Inc. of Dallas, Texas, manufacturers of automotive engine rebuilding machines, has been marketing a surface refinishing machine for producing a smooth, wear-resisting surface on reground crankshaft journals. This machine was introduced two years ago and has since, according to the manufacturer, been put to use by industrial and railroad plants. They are now making this Kotafin machine available for wider industrial use. It is recommended for application in producing super-smooth wearing surfaces on shafts, rods, axles, tubing and pipe. Using a motor driven abrasive belt which travels over the work held between centers or in chucks and turning as in a lathe, the surface finishing operation takes a few seconds on surfaces that have been ground or turned to size. Belts of varying grits are available for producing the surface best suited for any specific purpose and type of metal. The finished surface is made to appear "chrome-plated" with the use of a special polishing compound available for use with the machine. It is built to handle shafts or rods up to 118 inches and can take crankshafts and off-set rods without any adjustment. The Kotafin machine is furnished as a complete unit. Attachments are available for any engine lathe and most shaft-grinding machines. It is also built for special applications. For further information write Storm-Vulcan, Inc., 2504 Commerce St., Dallas 1, Texas.

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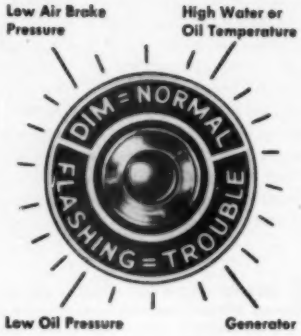

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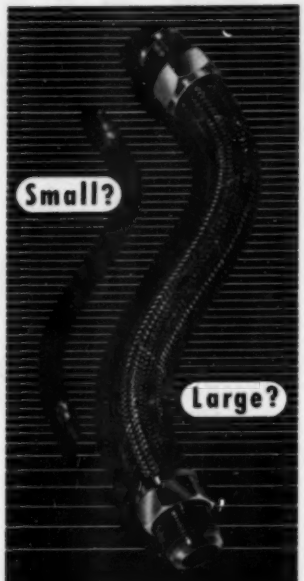

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Adds to Sales Staff

Grant C. Woodard

The Cooper-Bessemer Corporation announces the appointment of Grant C. Woodard to its field sales and engineering staff. Mr. Woodard will directly assist Mr. C. J. Michelson who at present represents Cooper-Bessemer in the territories of Michigan, Ohio, West Virginia, Kentucky and Tennessee, under the direction of Mr. F. M. Devin, territorial manager of Cooper-Bessemer's Locomotive Diesel Engine Division. A World War II Air Force lieutenant, Mr. Woodard has been undergoing extensive sales engineering training for several years at Cooper-Bessemer's Mt. Vernon, Ohio, plant. He is a graduate of Cornell University, 1948, and holds a bachelor of science degree in administrative engineering from that school.

Two-Color Bulletin Published

Construction and operation features of the Nordberg four-cycle, one cylinder and recently introduced two-cylinder, vertical, mechanical injection, Type 4FS diesel engine are contained in a new two-color bulletin published by Nordberg Manufacturing Company, Milwaukee 7, Wisconsin. The Nordberg engines described in this Bulletin 183 are built with a 4½-inch bore and 5¼-inch stroke and are available with electric or manual starting. Within an operating speed range of 1200 to 1800 rpm., the one-cylinder engine develops 10 to 15 hp. and the two-cylinder unit, 20 to 30 hp. The engines are offered as complete, self-contained, ready to operate electric generating sets, pumping units and with clutch or stub-shaft power take-off for direct connection or belt drive. The bulletin illustrates these various engine applications and gives kilowatt ratings and pumping capacities of the different models. Pictured in the bulletin are all main engine parts and their particular specifications. Full pressure lubrication, diaphragm type fuel transfer pump, mechanical flyball type governor, conventional type cooling systems, low fuel consumption and easy starting are other features described. Bulletin 183 is free on request to the company, Milwaukee 7, Wisconsin.

Oil Salesmen Helped

Oil salesmen throughout these United States, throughout the world for that matter, have found the DIESEL ENGINE CATALOG of great value to them in their field work. This possibly explains why 57 Socony-Vacuum field salesmen have spent $570.00 amongst themselves to buy this book. When a field salesman spends $10.00 for a book like DIESEL ENGINE CATALOG, he has to know that it is going to do the job for him. This book does. This is a hearty recommendation to every other oil company field salesman. Buy a copy of the DIESEL ENGINE CATALOG today. Send $10.00 to DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46, California, and the book will be on its way to you the next day. Five books in one, turn to page 89 for a complete listing of engines described in the catalog.

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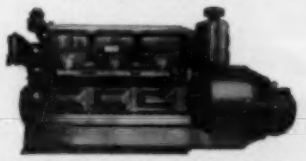

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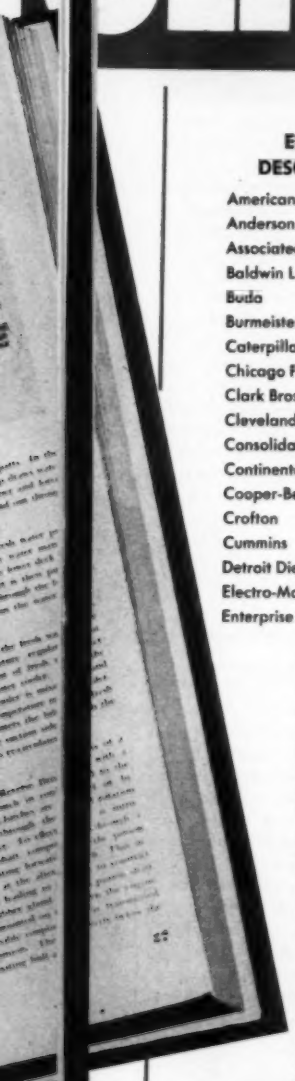

ENGINES LISTED AND DESCRIBED IN VOLUME 15

American Locomotive
Anderson O'Brien
Associated British Oil Engines
Baldwin Locomotive Works
Buda
Burmeister & Wain
Caterpillar
Chicago Pneumatic
Clark Bros.
Cleveland Diesel
Consolidated Diesel Electric
Continental
Cooper-Bessemer
Crofton
Cummins
Detroit Diesel
Electro-Motive
Enterprise
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In November, 1950, thousands of top executives took a look at their Payroll Savings Plans. Then, through a simple person-to-person canvass of their employees they made sure that every man and woman was given a Payroll Savings Application Blank and an opportunity to make his or her own decision. The results would be astonishing to any but Americans. Without pressure or emotional appeal, employee participation jumped from 30%, 40%, to 80% . . . 85% and even higher. More than a million workers have joined the Payroll Plan or increased their monthly investment.

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Editor—DIESEL PROGRESS

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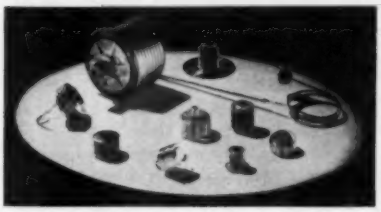

A twenty page, two-color catalog describing the applications of Flexon bellows, assemblies and devices has been issued by the Chicago Metal Hose Corporation of Maywood, Illinois. Especially suited for applications of control devices and instrumentation such as regulators, valves, steam traps, shaft seals, expansion connections and flexible connectors for misalignment, Flexon bellows come in single and multiple ply construction. The bellows are manufactured of brass, stainless steel, bronze, and monel in various lengths depending on the application requirements. They may be provided with a variety of fittings to meet customer's specifications. Many types of attachments can be provided according to the manufacturer, such as electrical circular seam welding of fittings to stainless steel bellows to provide uni-metal assemblies. Other methods of attachment such as silver brazing and soldering can also be furnished. For further information write Chicago Metal Hose Corporation, 1316 So. Third Avenue, Maywood, Illinois, and request a copy of their Bellows Catalog CMH-113.

Sales and Service Engineer

Thomas B. McMeekin

The appointment of Thomas B. McMeekin as sales and service engineer, Heavy Machinery Division, San Francisco office, has been announced by R. W. Bayerlein, vice president of this division of the Nordberg Manufacturing Company. Mr. McMeekin will assume the duties of George Lienhard who has resigned. He brings to his position a background as a chief ship's engineer, installation supervisor on ships diesel engines and service engineer for locomotives.

Manzel AUTOMATIC FORCE FEED LUBRICATION

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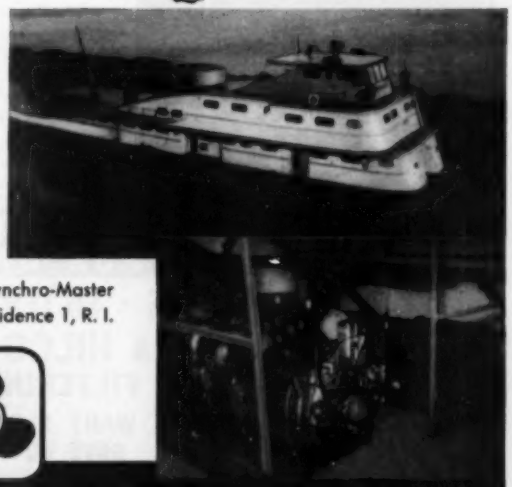

Shudders characteristic of twin and multiple screw boats can be greatly reduced by Synchro-Master which automatically controls the relative speeds (revs.) of all engines. Give us a chance to prove this, by writing for data and recommendations. Address inquiries to %Proportioneers, Inc.%, Synchro-Master Division, P. O. Box 1442, Providence 1, R. I.

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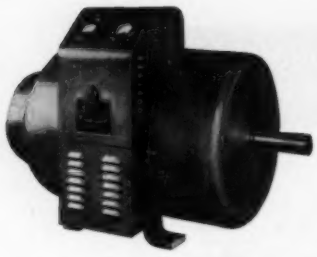

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West Coast Diesel News

By FRED M. BURT

PURCHASED by Inspiration Copper Co., Miami, Ariz., six 300-hp. Cummins diesel engines to repower Dart (off-highway) trucks used in hauling ore.

A 48-FOOT combination fishing boat, *New Roz*, under construction by Monterey Boat Works for Frank Arcoleo will be powered with a General Motors Model 671, 165-hp. marine diesel with 3:1 Twin Disc reverse and reduction gear.

UNDER construction for Andrea, Louis and Joseph Castagnola, San Diego, a new 127-foot tuna clipper by National Steel and Shipbuilding Co., to be powered with an 800-hp. Enterprise diesel with two Murphy diesels to drive two 133-kw. generators.

TO SUPPLY compresed air for drills and other uses in constructing the Tecolete Tunnel to bring water from Cachuma Dam to Santa Barbara, Calif. five 500-cfm. Gardner-Denver air compressors in line, each powered with a 120-hp. Caterpillar diesel.

FROM HOVER Equipment Co., Monterey, General Motors diesels for re-powering; for hook-and-line craft *Dale T. M. Takao*, a 2-cyl. unit, 3:1 Snow & Habstedt gears; for Manuel Peters *Happy Toiler*, GM 371 with 3:1 reduction gears; combination boat *Rujac*, another Model 371, for John Mandy, Moss Landing.

THE 66-FOOT *Maple Leaf C*, of the British Columbia Packers fleet, powered with a 90-hp. Murphy diesel made the biggest herring catch in a single set, 1260 tons, breaking all West Coast herring fishing records; skipper was Capt. Mel Stauffer.

TO SUPPLY power for a flour mill in La Paz, Baja California, from local Waukesha dealer Salvatore Castro, a Model 148 DK, 150-hp. Waukesha diesel engine.

THREE 54-FOOT steel shrimp trawlers for Cia. Productos Congelados, S. A. Guaymas, Mexico, recently launched by National Steel Shipbuilding Co., San Diego, are powered with 125-hp. Murphy Marine diesels, with 3:1 Twin Disc reduction gears.

CUMMINS diesel powered Sterling trucks supplied through Sterling Truck Co., Los Angeles—two 275-hp. tractors for Frank West, Los Angeles contract hauler; six tankers for Cantlay & Tanzola, Los Angeles, with 200-hp. diesel engines.

FOR USE on a construction job in Renton, Wash., by Consolidated Western Steel Co., a stationary type, two-drum hoist, converted from steam power by using a 53-hp. Caterpilalr diesel, with Twin Disc torque converter.

INSTALLED at the Bakersfield, Calif., sewage disposal plant, six new 125-hp. Buda engines to operate on sewage gas, powering pumps and blowers, equipped with Vapor Phase heat recovery systems to provide low pressure steam to heat digester tanks, also for space heaters and a 200-gal. hot water heater in the laboratory.

FROM Arizona—Cedar Rapids Co., Phoenix, Ariz., to power a Cedar Rapids portable crushing plant, for use by the Arizona Highway Dept., a 150-hp., 1400-rpm., Waukesha diesel engine.

TO SUPPLY power for drilling operations, eight portable, Denver-Gardner 500-cfm. air compressors have been installed in-line, at the Eagle Mountain iron ore mine of Kaiser Steel Corp. Each is powered with a 120-hp. Caterpillar diesel.

UNDER construction by Campbell Machine Co., San Diego, a 150-foot wooden tuna clipper for Joe S. Rogers and Associates; main power an 840-hp., super-charged Union diesel; also two Union 200-hp. auxiliary, diesel generating sets, with a third Union standby.

FOR PACIFIC Freight Lines, five Cab-Over-Engine Kenworth tractors with 225-hp. Cummins diesels; two Kenworth trucks for Asbury Transportation Co., with 200-hp. Cummins diesels, both of Los Angeles.

AT SHORELINE Diesel Maintenance, Fisherman's Wharf, San Francisco, installation of 4-cyl. General Motors diesel to re-power hook-and-liner *Frankie Joe* for Vito Pomilia; a 3-cyl. G.M. in Frank Billante's hook-and-liner *Frankie Boy*.

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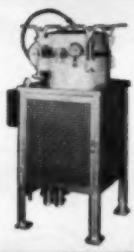

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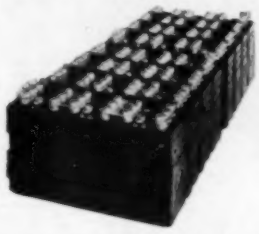
RAILROAD
DIESEL STARTING

2 models—THR-30, THR-44



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Because the NICAD nickel cadmium storage battery requires less maintenance you save precious man hours and, at the same time, are assured of reliable, foolproof battery service throughout its long life. The T-Type NICAD battery has an exceptionally high ampere rate of discharge at useful voltage, a vital consideration in engine-starting applications.

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THR-44	210	48	44¾"	11"	2073

THR-30—Interchangeable with 17-plate, 248 A.H. Lead Acid Batteries
THR-44—Interchangeable with 25-plate, 426 A.H. Lead Acid Batteries

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ing the winter for out-of-season markets in the United States, seven more 57-hp. Waukesha diesels; (a total of 25 for this purpose during the past two years).

IN THE shopping center built by Caruth Corp., in Dallas, (engineered and financed by Lone Star Gas Co.), power is supplied by four 150-hp. Waukesha natural gas engines with Electric Machinery Co. generators, (a packaged unit built up by Ready Power Co., Detroit). Vapor Phase units (from Engineering Controls) provide complete waste heat recovery for low pressure steam used in a laundromat and for two 20-ton Servel air-conditioning units; other uses to follow.

THREE MORE 80-hp. Buda dual fuel engines to operate on sewer gas, to power pumps and blowers at the Visalia, Calif. sewage disposal plant, have Vapor Phase units for heat recovery from cooling water and jacket heat, to produce low pressure steam used for heating digester tanks.

ON A U.S. Dept. of Interior dredge, *Colorado*, operating out of Needles, in the Colorado River, a new 55-hp. Caterpillar diesel to drive a 40-kw. General Electric auxiliary generator. Purchased from Shepherd Tractor & Equip Co., Los Angeles.

THE NEW 121-foot tuna clipper *Antoinette B* is powered by a 600-hp. super-charged Enterprise diesel, wtih two 90-kw. Murphy diesel generating sets; the 12th tuna clipper built by National Steel & Shipbuilding Corp., San Diego, since 1945; built for the Bogdanovich family, launched Jan. 27; skipper will be Richard W. Joseph.

CATERPILLAR 38-hp. marine diesels installed in 35-foot commercial fishing boats with Twin Disc reverse and reduction gears—for Warren E. Beadle, San Pedro; for Nick Delaney of Laguna Beach; latter installation made by Shepherd Diesel Marine in San Diego.

TO RE-POWER Euclid dump trucks for Isbell Construction Co. of Santa Rita, New Mexico, engaged in a stripping contract at the Kennicott Copper mine, six 275-hp. super-charged Cummins diesels.

FROM Engine Sales & Service, Los Angeles, a 150-hp. Murphy diesel driving a 100-kw. Electric Machinery generator, for Transhippers, Inc. to supply power at the Bessemer iron mine in Lucerne Valley, Southern California; a new, but large, iron mining project.

FOR TRANSCON Lines, Los Angeles, three International trucks powered with 150-hp. Cummins diesels; for Graham Bros., El Monte, Calif. (sand and gravel aggregates), three International trucks with 275-hp. Cummins diesels.

SUPPLIED by Engine Sales & Service, Los Angeles, to Peerless Pump Co., a Model 14, 5-hp., air-cooled Sheppard diesel for direct-connection to a centrifugal pump; to U. S. Pump Co., a Model CD, 12-hp. Witte diesel, for V-belt connection to deep-well pump, for irrigation near San Diego.

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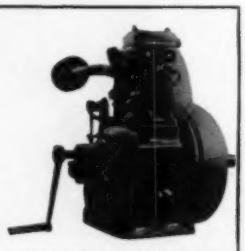

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Crofton
DIESEL ENGINE COMPANY
San Diego, California

Inland River Reports

By DAVID I. DAY

THE SECOND group of diesel vessels built by Higgins, Inc., New Orleans, for the Empreza Internacional de Transportes, Ltd., Rio de Janeiro, has arrived in Brazil by ocean tow and are in service. These two vessels are for ferry service and measure 144.6 by 4.26 feet, all-welded construction, twin-screw and powered by Fairbanks-Morse diesels of 610 hp. at 710 rpm.

THE BRAND-NEW diesel towboat *Claude Tully*, powered by two 1600 hp. Fairbanks-Morse diesels is at work on the Mississippi for the Patton-Tully Transportation Company, Memphis, Tenn. She was recently completed at the yards of the St. Louis Shipbuilding & Steel Co. This boat is 150 ft. by 35 ft. by 10 ft. in dimensions and has demonstrated her ability to shove three barges each 290 ft. by 50 ft. at approximately 12 miles per hour. This new oil pusher is one of a number of similar size to be constructed in 1951 at the well-known St. Louis yards.

ICE HAS all but completely disappeared from the upper Mississippi River. All the river folk knew this before the news came out in the daily papers because many diesel towboats which have been working below Memphis started upstream headed for the port of Minneapolis-St. Paul. One of the first to start its northern trek we noted the *Laguna* of the Paraland Oil Company fleet, observed passing St. Louis.

ONE OF THE finest demonstrations of the superiority of diesels, year in and year out, is the work of the steel hull dredge *Mountaineer*, 24 ft. by 100 ft., powered by two Caterpillar diesels coupled to electric drive. It is now at work on the Allegheny River near Six Mile Island. Owner, Sand & Gravel, Inc., Pittsburgh, Pa.

HEAVY TRAFFIC marked the upper Ohio in March. Movement of oil, coal, gasoline, sulphur, scrap metal and rather unusual cargoes of chlorine and caustic soda made an almost ceaseless parade of diesel vessels both up and down. Noted within a few hours at and near one point above the little river town of Clarington, Ohio, were such well-liked towboats as the *Patriot*, *Jefferson*, *Frank*

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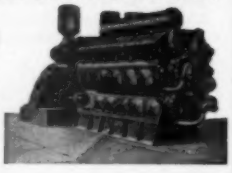

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C. Rand, Ernest T. Weir, Bull Frog, Fred W. Olcott, Jim Martin and *Jack Don*. It was easily discernible all the way from Cincinnati to Pittsburgh that this last stronghold of the stern-wheel is turning to diesels. Several more steamers will be converted to diesel in 1951.

THE 33 YEAR OLD steamer *Ralph E. Vennum* is no longer a steamer at all. She was recently changed to diesel and is handling barges in Memphis harbor for Warner & Tamble of that city. The change is already improving efficiency at lower operating costs.

NOTED THE *Celeste*—a rare towboat pushing heavy oil tows from Helena, Ark., below Memphis, to Cincinnati, commanded by Capt. C. G. McCandless. Your correspondent witnessed the launching of this boat at the St. Louis yards in 1942. She is 124 ft. by 30 ft. by 9 ft. and no boat of her size in nine years ever pushed more oil up the rivers, much of it all the way from Houston. This craft has been a pride of the fleet of the Southern States Barge Lines, St. Louis.

AN ORDER for three new 5,000 hp. diesel towboats is being filled by the Calumet Shipyard & Dry Dock Co., Chicago, Ill., for the Ashland Oil & Refining Co., Ashland, Ky. It is believed that General Motors (Cleveland) diesel engines will power all three. The first two will be triple screw type. The last one may possibly be a twin screw vessel.

TWO MORE steamboats are no more—the *Chisca* and the *Greenbrier*. Everywhere diesels are taking over on the rivers.

Diesel Engine Catalog

One hundred and twenty-one Fairbanks, Morse diesel salesmen have invested $1210.00 in individual copies of the DIESEL ENGINE CATALOG for the simple reason that these 121 diesel salesmen have found this book extremely useful to them in their day by day operations. Possibly one of the reasons for so many salesmen of this one company deciding to carry this book around with them in their cars is that all competitive information is contained between these two covers. This DIESEL ENGINE CATALOG, Volume 15, contains a detailed description of every diesel engine manufactured and sold in these United States. Its price of $10.00 is a very low one when compared with the usefulness of the information that it contains. Just send $10.00 to DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46 California, and a copy will be on its way to you the next day.

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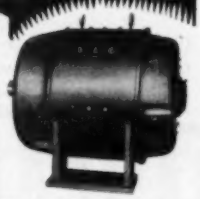

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ADVERTISERS' INDEX

ABOE, Inc. 13
Aerofin Corporation 67
Air-Maze Corporation 3
American Bosch Corporation 4
American Locomotive Company 19
American Motors Co. 96
Atlantic Metal Hose Co., Inc. 79

Bacharach Industrial Instrument Co. 82
Brown & Sharpe Mfg. Co. 79
Buda Company, The 21

C. A. V. Ltd. 78
Chicago Metal Hose Corp. 68
Cities Service Oil Co. 23
Cleveland Diesel Engine Div., General Motors Corp. 2
Columbia Electric Mfg. Co. 95
Cooper-Bessemer Corp. ..... Fourth Cover
Crofton Diesel Engine Co., Inc. 94
Cummins Engine Co., Inc. 5

DeLaval Separator Co., The 6
Delco-Remy Div., General Motors Corp. 15
Diamond Chain Co., Inc. 65
Diesel Modification, Inc. 94

Eaton Manufacturing Co. 81
Electric Auto-Lite Co., The 30
Electric Machinery Mfg. Co. 92
Electro Products Laboratories, Inc. 86
Elliott Company ..... Third Cover
Engineering Controls, Inc. 72
Erie Bolt & Nut Co. 82
Erie Forge Co. 22

Fairbanks, Morse & Co. 11
Fluor Corporation, Ltd., The 27
Fram Corporation 69
Fulton Iron Works Company 74

Gardner-Denver Company 8
General Motors Corp.
Cleveland Diesel Engine Div. 2
Delco-Remy Div. 15
Griscom-Russell Co., The 61
Guth Company 92

Harnischfeger Corp., P & H Diesel 59
Hilliard Corporation 92
Honan-Crane Corp. 85

Illinois Testing Laboratories, Inc. 75
Interstate Training Service 94

Johnson Bronze Co. 73

Koppers Company, Inc. 18
Korfund Company, Inc., The 83
Kurz & Root Co. 95

Lister-Blackstone, Inc. 70

Mack Trucks 25
Manzel Div. of Frontier Industries, Inc. 91
Marley Company, Inc., The 20

National Welding & Grinding Co. 94
Nickel Cadmium Battery Corp. 93
Nordberg Mfg. Co. 7

Pesco Products Div., Borg-Warner Corp. 17
Petrometer Corp. 95
Pierce Governors 95
%Proportioneers, Inc.% Synchro-Master Division 91
Purolator Products, Inc. 14

Reiner & Co., John 69
Rochester Manufacturing Co., Inc. 86
Rockford Clutch Div., Borg-Warner 76
Ross Heater & Mfg. Co., Inc. 10
Russell Newbery & Co., Ltd. 80

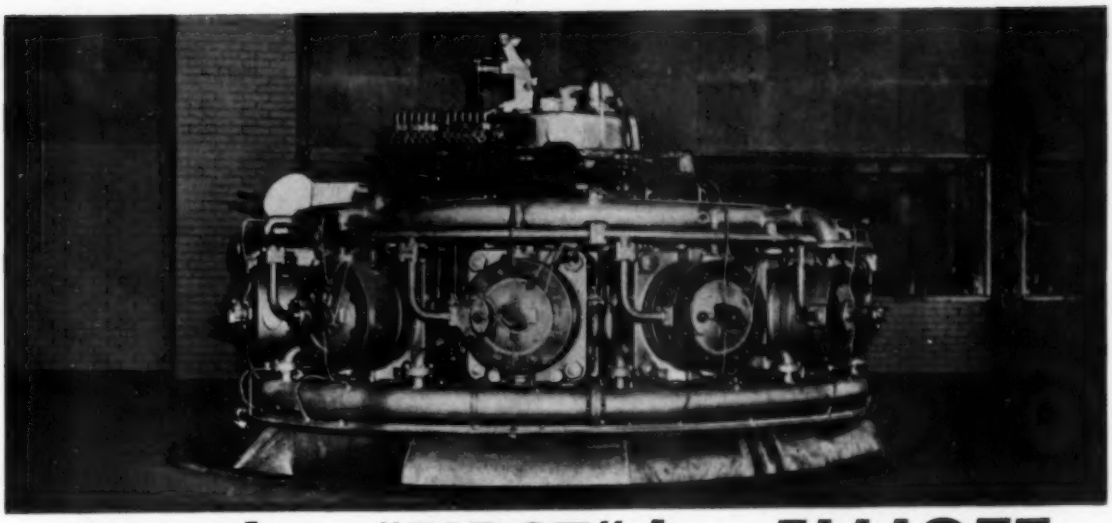
Schoonmaker Co., A. G. 94
Sealed Power Corp. 24
Shell Oil Company, Inc. 28-29
Sinclair Refining Co. 32
Standard Oil Co. (Indiana) 9
Sterling Engine Co. 77
Struthers Wells Corporation 83
Sturtevant Co., P. A. 94
Synchro-Start Products, Inc. 69

Texas Co., The ..... Second Cover-1
Thomas Flexible Coupling Co. 87
Titeflex, Inc. 87
Tuthill Pump Company 96
Twin Disc Clutch Co. 16

Union Diesel Engine Co. 84
United States Hoffman Machinery Corp. 71
Utilities Engineering Institute 95

Van Der Horst Corporation of America 95

Washington Iron Works, Inc. 79
Waterbury Tool Div., Vickers, Inc. 93
Westinghouse Electric Corp. 12



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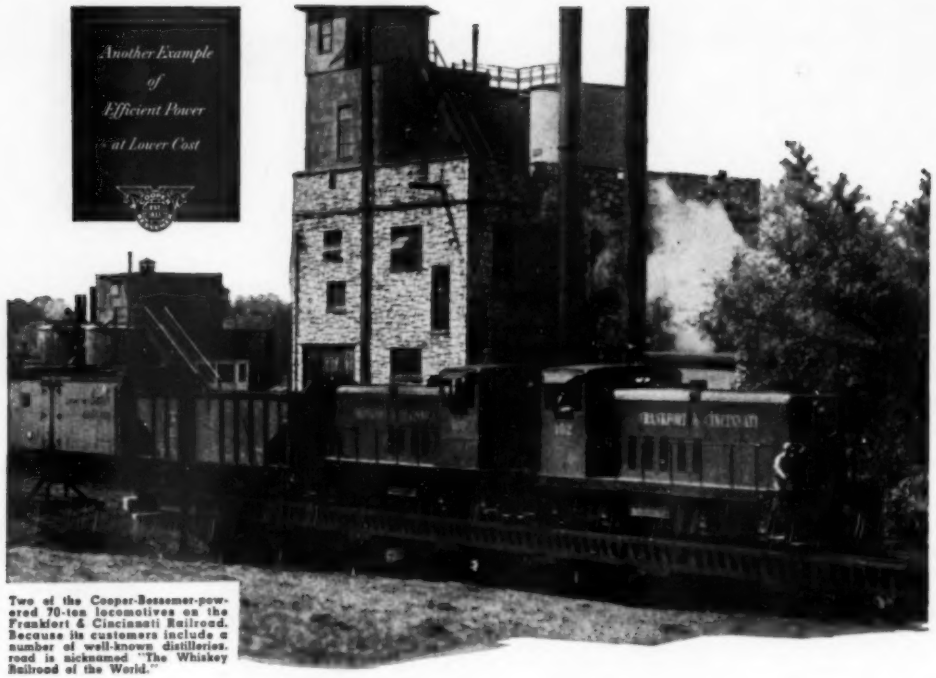

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